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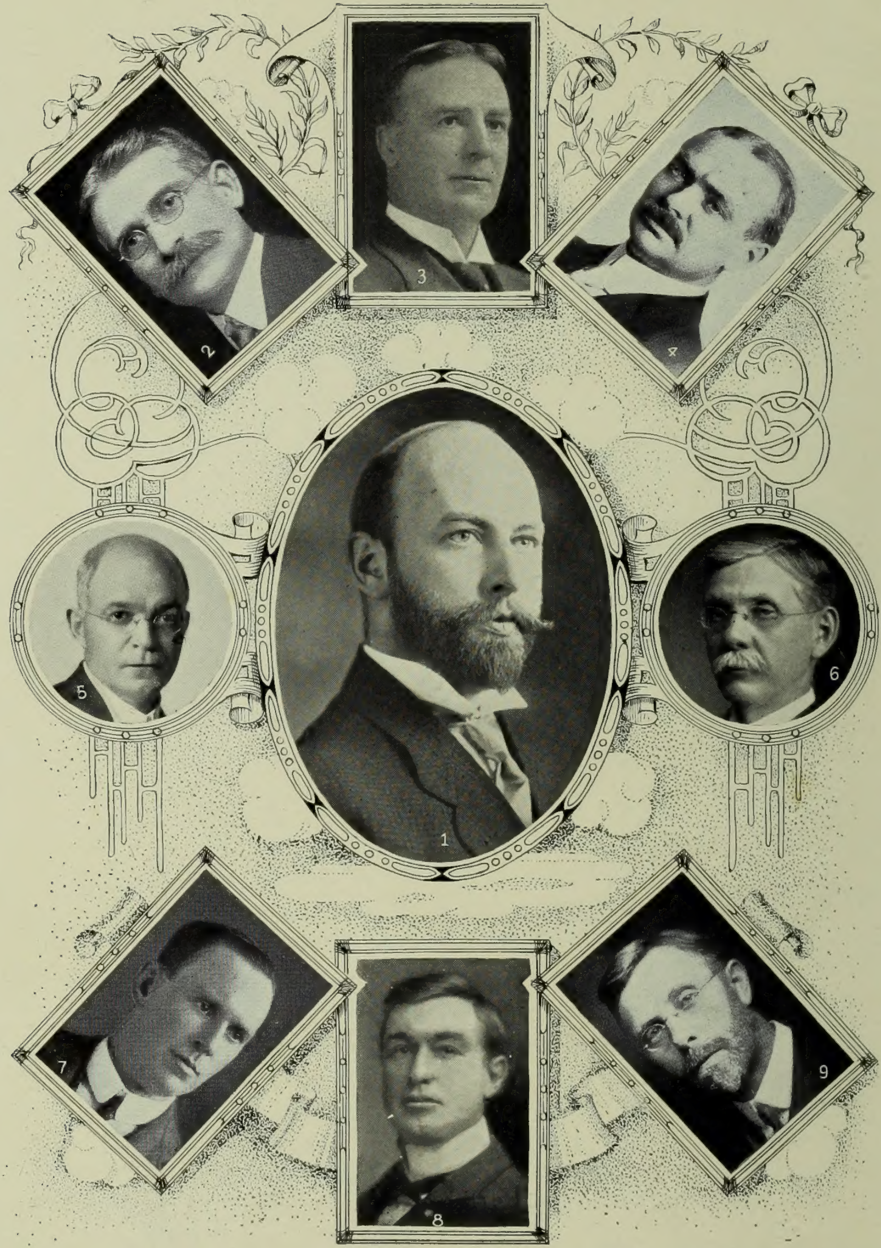

Courtesy of American Veterinary Review.

2. G. H. Roberts 3. John W. Adams 4. H. Jensen
5. C. E. Cotton 1. John R. Mohler 6. V. A. Moore
7. C. J. Marshall 8. George R. White 9. S. H. Burnett

PROCEEDINGS

OF THE

AMERICAN VETERINARY MEDICAL ASSOCIATION

FIFTIETH ANNUAL CONVENTION, HELD AT NEW YORK CITY, N. Y., SEPTEMBER 1, 2, 3, 4 AND 5, 1913

EDITED BY

JOHN R. MOHLER

CHAIRMAN PUBLICATION COMMITTEE, WASHINGTON, D. C.

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OFFICERS, 1912-1913

HONORARY PRESIDENT.

A. Liautard, Paris, France.

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John R. Mohler, Washington, D. C.

VICE-PRESIDENTS.

G. H. Roberts, Indianapolis, Ind.
John W. Adams, Philadelphia, Pa.
H. Jensen, Kansas City, Mo.
C. E. Cotton, Minneapolis, Minn.
V. A. Moore, Ithaca, N. Y.

SECRETARY.

C. J. Marshall, Philadelphia, Pa.

TREASURER.

George R. White, Nashville, Tenn.

LIBRARIAN.

S. H. Burnett, Ithaca, N. Y.

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Joseph Hughes,
F. Torrance,
Harry D. Gill,
David F. Fox.

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Pierre A. Fish,
C. H. Stange,
W. B. Craig,
R. A. Archibald.

DISEASES.

V. A. Moore, *Chairman.*

L. Van Es,
A. T. Kinsley,
K. F. Meyer,
C. M. Haring.

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F. A. Bolser,
John P. Turner,
Jas. Robertson.

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H. Preston Hoskins,
A. S. Cooley.

PUBLICATION.

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J. H. Blattenberg,
C. J. Marshall,
Ward Giltner.

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Orville L. Boor, *Chairman,*

S. Brenton,
J. G. Wills,
A. H. Baker,
A. Bostrom.

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G. A. Johnson,
S. H. Ward,
G. B. McKillip.

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SPECIAL COMMITTEE FOR THE FIFTIETH ANNIVERSARY CELEBRATION.

A. Liautard, *Honorary Chairman*,
W. Horace Hoskins, *Active Chairman*,

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George H. Berns,
R. W. Ellis,
James Robertson,
W. J. Coates,
D. W. Cochran,
R. H. Kingston,
Thomas Bland,
J. E. Ryder,
Harry D. Gill,
E. B. Ackerman,
W. L. Williams,
W. Reid Blair,
C. E. Clayton,
T. E. Smith,
J. B. Hopper,
W. G. Hollingworth,
William Dougherty,
William Herbert Lowe.

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Veranus A. Moore,
John R. Hurty,
John R. Mohler,
J. J. Ferguson,
E. C. Schroeder,
T. W. Tomlinson,
J. W. Flavelle,
W. D. Hoard,
W. C. Edwards,
Frederick Torrance,
C. A. Hodgetts,
Mazyck P. Ravenel,
M. H. Reynolds, *Secretary*.

REVISION OF VETERINARY ANATOMICAL NOMENCLATURE.

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I. E. Newsom,
S. L. Stewart.

VETERINARY COLLEGE INVESTIGATION.

M. H. Reynolds, *Chairman*,

George W. Dunphy,
P. H. Browning.

AGRICULTURAL COLLEGE INVESTIGATION.

A. M. Farrington, *Chairman*.

Paul Fischer,
James B. Paige.

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C. A. Cary,
S. B. Nelson.

INVESTIGATION OF GLANDERS.

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Adolph Eichhorn,
Charles E. Cotton,
Charles Keane,
C. D. McGilvray,
John Reichel, *Secretary.*

REORGANIZATION OF ASSOCIATION.

D. E. Salmon, *Chairman,*
D. M. Campbell,
George H. Hart,
James Law,
C. J. Marshall.

RESIDENT SECRETARIES, 1912-1913

UNITED STATES

Alabama—C. A. Cary, Auburn.
Arizona—J. C. Norton, Phoenix.
Arkansas—J. F. Stanford, Fayetteville.
California—David F. Fox, Sacremento.
Colorado—I. E. Newson, Fort Collins.
Connecticut—G. W. Loveland, Torrington.
Delaware—H. P. Eves, Wilmington.
District of Columbia—R. W. Hickman, Washington.
Florida—Thomas J. Mahaffy, Jacksonville.
Georgia—William M. Burson, Athens.
Hawaii—V. A. Norgaard, Honolulu.
Idaho—G. E. Noble, Boise City.
Illinois—L. A. Merillat, Chicago.
Indiana—J. W. Klotz, Noblesville.
Iowa—Wm. W. Dimock, Ames.
Kansas—Kirk W. Stouder, Manhattan.
Kentucky—L. M. Land, Lexington.
Louisiana—E. A. White, New Orleans.
Maine—A. Joly, Waterville.
Maryland—Frank H. Mackie, Baltimore.
Massachusetts—Francis Abele, Jr., Quincy.
Michigan—James J. Joy, Detroit.
Minnesota—G. Ed. Leech, Winona.
Mississippi—E. M. Ranck, Agricultural College.
Missouri—F. F. Brown, Kansas City.
Montana—A. H. Cheney, Miles City.
Nebraska—P. Juckniess, South Omaha.
Nevada—W. B. Mack, Reno.
New Hampshire—F. A. Allen, Nashua.
New Jersey—J. P. Lowe, Passaic.
New Mexico—Marion Imes, Albuquerque.
New York—John F. DeVine, Goshen.
North Carolina—Wm. G. Chrisman, Raleigh.
North Dakota—W. F. Crewe, Devil's Lake.
Ohio—J. D. Fair, Millersburg.
Oklahoma—Charles H. Jewell, Fort Sill.
Oregon—W. Dean Wright, Portland.
Pennsylvania—F. H. Schneider, Philadelphia.
Philippines—A. R. Ward, Manila.
Porto Rico—Carlos Ortiz, Ponce.
Rhode Island—John S. Pollard, Providence.
South Carolina—Enoch Barnett, Clemson College.
South Dakota—Stanley W. Allen, Watertown.
Tennessee—M. Jacob, Knoxville.
Texas—R. P. Marsteller, College Station.
Utah—H. J. Frederick, Logan.
Vermont—F. A. Rich, Burlington.
Virginia—George C. Faville, Norfolk.

Washington—J. T. Seeley, Seattle.
West Virginia—L. N. Reefer, Wheeling.
Wisconsin—W. G. Clark, Marinette.
Wyoming—Otto L. Prien, Laramie.

AUSTRALIA.

Australia—J. Desmond, Adelaide.

CANADA.

Alberta—Edward A. Watson, Lethbridge.
British Columbia—Seymour Hadwen, Agassiz.
Manitoba—C. D. McGilvray, Winnipeg.
New Brunswick—D. McQuaig, McAdam Junction.
Nova Scotia—William Jakeman, Glace Bay.
Ontario—D. McAlpine, Brockville.
Prince Edward Island—W. H. Pethick, Charlottetown.
Quebec—M. C. Baker, Montreal.
Saskatchewan—D. S. Tamblyn, Regina.

SOUTH AMERICA.

Brazil—John H. McNeil, Sao Paulo.

CONSTITUTION AND BY-LAWS OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION

(REVISED SEPTEMBER, 1913)

CONSTITUTION.

ARTICLE I. NAME.

This Association shall be known as the American Veterinary Medical Association. It shall consist of active and honorary members.

ARTICLE II. OBJECTS.

The objects of this Association are to promote good fellowship; to elevate the standards of veterinary education; to cultivate medical science and literature; to enlighten and direct public opinion regarding veterinary problems of state medicine; to protect the material interests of the veterinary profession and present to the world its achievements.

ARTICLE III. OFFICERS, ETC.

SECTION 1.—The officers of this Association shall be a President, five Vice-Presidents, a Secretary, a Treasurer and a Librarian. These officers, except the Librarian, shall be elected by ballot at each annual meeting, and a majority of all votes cast shall be necessary to a choice. The term of said officers shall be one year or until their successors are chosen. They shall, without delay, transfer to their successors all property belonging to the Association.

SECTION 2.—The President, the five Vice-Presidents, the Secretary and the Treasurer, together with six members to be appointed annually by the President, shall constitute the Executive Committee. The President shall designate one of the members as Chairman of said committee.

SECTION 3.—The duties of officers, requisites of membership, times of annual or other meetings of this Association, and such regulations as may be necessary for the government of the same, shall be provided for in the By-Laws.

BY-LAWS.

ARTICLE I. PRESIDENT.

SECTION 1.—It shall be the duty of the President to preside at all meetings of the Association, to preserve order and decorum, and to present an address at the annual meeting following his election. The President's address shall be referred to the Executive Committee for such consideration and action as may by said committee be deemed advisable. The President shall not be eligible for re-election so as to serve two successive terms.

SECTION 2.—The President shall have power to order the payment of bills that may be presented to the Secretary during the year prior to the annual meeting, if, in the judgment of the Secretary, said bills are true and correct, and the President deems it advisable to make immediate payment.

SECTION 3.—He shall have power to temporarily fill vacancies that may occur in the elective offices; he shall appoint all committees unless otherwise ordered by the Association, and shall perform all the duties prescribed by the By-Laws and Resolutions of the Association.

SECTION 4.—He shall annually appoint Resident Secretaries who shall perform such duties as are herein assigned to them.

SECTION 5.—He shall have power to rescind appointment of members of committees or of Resident Secretaries pending investigation by the Executive Committee, if, in his opinion, such party has violated the code of ethics of the Association.

SECTION 6.—He shall have no vote except on questions where the votes are equally divided and in the election of officers.

SECTION 7.—He shall keep on file all official documents relating to the Association that may come into his care.

ARTICLE II. VICE-PRESIDENTS.

It shall be the duty of the Vice-Presidents, in the order of their elective seniority, to perform the duties of the President in case of the latter's absence or inability to serve or conduct the affairs of the Association. They shall otherwise assist the President as he may from time to time determine.

ARTICLE III. SECRETARY.

SECTION 1.—The Secretary shall keep the records of the proceedings of the Association. He shall receive all applications for membership, all fees and dues, and shall pay over all moneys to the Treasurer at least once in three months. He shall give security for the trust imposed in him.

SECTION 2.—It shall be the duty of the Secretary to notify each candidate of the receipt of his application for membership and transmit to him a copy of the Constitution and By-Laws, calling attention to the first, second, third and fourth Sections of Article X of the By-Laws.

SECTION 3.—He shall notify, in writing, the Chairman and other members of all committees of their appointment by the President or by the Association, giving the name, duties, and membership of the committee; he shall also notify each Resident Secretary of his appointment, and shall perform such other duties as may be assigned to him.

SECTION 4.—He shall publish in each report of the proceedings of the annual meeting of the Association a list of officers, regular committees, honor, active and honorary members, with their address.

SECTION 5.—The Secretary shall receive an annual salary of five hundred dollars and such expenditures as may be necessary in attendance at the annual meeting following his election.

ARTICLE IV. TREASURER.

SECTION 1.—The Treasurer shall receive and have charge of the funds of the Association, and shall give security to the amount of one thousand ($1,000.00) dollars for the trust imposed in him.

SECTION 2.—It shall be the duty of the Treasurer to put all the moneys of the Association into one fund to be appropriated for the payment of current expenses and for such other uses as the Association may direct.

SECTION 3.—He shall pay all bills which come into his hands duly approved by the President and Secretary.

SECTION 4.—At each annual meeting he shall give a detailed statement of all his official receipts and disbursements, which statement must be duly audited and signed by the Committee on Finance.

ARTICLE V. LIBRARIAN.

SECTION 1.—The Librarian shall receive and have charge of all documents, files and published annual proceedings and other properties belonging to the Association submitted to him by the Association or its officers. He shall be elected by ballot and continue in office until his successor is chosen. He shall not, unless otherwise appointed, constitute a member of the Executive Committee.

ARTICLE VI. EXECUTIVE COMMITTEE.

SECTION 1.—The Executive Committee shall meet on the day previous to the opening of the annual meeting of the Association, and shall hold such adjourned meetings as the business of the Association may require.

SECTION 2.—The President may call a special meeting of the Executive Committee whenever he shall deem it necessary.

SECTION 3.—A majority of the committee shall constitute a quorum for the transaction of business. Any vacancy due to the absence of an appointed member, whenever a quorum is lacking, shall be temporarily filled by the President, acting Vice-President, or in their absence, by the Chairman of the Committee.

SECTION 4.—The records of the proceedings of the Executive Committee shall be kept by the Secretary.

SECTION 5.—The Executive Committee shall be invested with power to hear and determine upon complaints filed before it in writing relative to the improper conduct of any member of the Association, and shall, if thought advisable, summon the member so charged to appear before it at the next annual meeting of the Association to answer the charges and make defence. If the Committee, after fair and impartial trial at the said next annual meeting, finds the defendant guilty of all or part of the offence as charged, said Executive Committee shall report to the Association a summary of the charges and evidence submitted on both sides, together with such recommendation as may by said committee be deemed wise; but no public report of such charges or evidence shall be made by the Executive Committee or by any member thereof until after trial of the accused member.

SECTION 6.—The Executive Committee shall annually submit to the Association a list of all veterinary institutions, whether then operating or not, whose graduates shall be recommended as eligible to membership; further, shall execute such other duties as the Association may direct.

ARTICLE VII. COMMITTEES.

SECTION 1.—The regular committees of the Association, in addition to the Executive, shall be as follows, and the members of each regular committee shall be appointed by the President at each annual meeting or as soon thereafter as may be practicable.

Committee on Intelligence and Education, five members.

Committee on Diseases, five members.

Committee on Legislation, five members.

Committee on Finance, three members.

Committee on Publication, five members.

Committee on Local Arrangements, number of members at option of President.

Committee on Necrology, five members.

Committee on Resolutions, five members.

SECTION 2.—It shall be the duty of the Committee on Intelligence and Education to collect, and, at each annual meeting, present to the Association information relative to veterinary sanitary work, recent veterinary facts and intelligence and veterinary legislation. It shall be within the province of this committee to inquire into the entrance requirements, curricula and educational methods of veterinary colleges, and to report to the Association such suggestions and criticisms concerning the same, as it may deem advisable.

SECTION 3.—It shall be the duty of the Committee on Diseases to investigate the character and extent of prevalent diseases throughout America and report upon the same at each meeting of the Association.

SECTION 4.—It shall be the duty of the Committee on Legislation to use its best efforts to secure the enactment or the defeat of such legislation as the Association directs.

SECTION 5.—It shall be the duty of the Committee on Finance to audit the financial records of the Secretary's and Treasurer's accounts. This committee shall also devise ways and means to raise funds, when necessary, to meet the expenditures of the Association, and shall report its proceedings at each annual meeting.

SECTION 6.—It shall be the duty of the Committee on Publication to make all necessary arrangements for reporting the meetings of the Association. Said committee shall have charge of the publication of all reported proceedings, papers, reports, and other documents submitted to it by the Association. It shall be authorized to make summaries of such local and other addresses as have not permanent scientific value and to summarize discussions of business and other matters that come before the Association when thought advisable by the committee. All bills incurred by the Committee on Publication must be first approved by the Chairman of said committee, and shall then follow the regular course as for other bills.

Section 7.—It shall be the duty of the Committee on Local Arrangements to make such local arrangements as may be necessary for the success of the meetings of the Association, to furnish for publication in the annual report of proceedings a suitable account of the clinic and entertainment, and to assist the President and Secretary as they may direct.

Section 8.—It shall be the duty of the Committee on Necrology to prepare and present memorials of deceased members.

Section 9.—It shall be the duty of the Committee on Resolutions to consider all resolutions which may be referred to it by the Association and report the same, together with such other resolutions as it may deem wise.

Section 10.—Each Resident Secretary shall annually submit to the Committee on Intelligence and Education a report concerning recent veterinary facts and prevalent diseases within his jurisdiction and shall aid the President and Secretary by the performance of such other duties as they may direct.

Section 11.—The President and Secretary shall be *ex-officio* members of the several regular committees, except the Committee on Publication, of which the Secretary shall be an active member. The President shall have power to convene any of the various committees whenever, in his judgment, such action shall be necessary.

Section 12.—All nominations for office in this Association shall be made from the floor.

Article VIII. Candidates for Membership.

Section 1.—Each application for membership shall be submitted in the applicant's own handwriting upon one of the application blanks of the Association, and be duly vouched for in their own handwriting by two active members of the Association in good standing, resident in the applicant's state or province, or by the President and Secretary of the Association. The application must be accompanied by eight (8) dollars to cover the membership fee and first year's dues, which sum shall be returned to the applicant should he fail of election to membership.

Section 2.—Except as provided in Sections two and four of this Article only those veterinarians may be admitted to active membership who have spent not less than three collegiate years in the study of veterinary medicine, and have been duly graduated from an accredited veterinary college conforming to the requirements of Regulations 1 to 19 inclusive, of *Bureau of Animal Industry Circular No.* 150, as printed on pages 175 to 182 of the Proceedings of the forty-ninth annual meeting of the A. V. M. A., 1912.

Section 3.—Matriculation to a recognized veterinary college shall be one year of high school work or its equivalent, beginning with the term of 1914–1915, and that the requirement be raised to two years of high school work, parts of different calendar years, or its equivalent, beginning with the session of 1918–1919.

Section 4.—A veterinarian, graduate of a veterinary college which, at the time of his graduation, did not maintain educational standards in conformity with the active membership requirements of this Association, may, upon recommendation of the Executive Committee, be elected to membership, provided he has been duly graduated not less than five years prior to the date of application, and further, that the college has ceased to graduate veterinarians contrary to the standards now fixed by this Association.

SECTION 5.—The following shall be the form of application blank:

APPLICATION FOR MEMBERSHIP.

REQUIREMENTS FOR ADMISSION TO MEMBERSHIP.

EXTRACTS FROM BY-LAWS.

(Here quote Sections 1 to 5, Article VIII.)

To the American Veterinary Medical Association:

....
(Date)

I hereby make application for membership in your Association. My age is............years. I was graduated from..in the
(Name of Veterinary School)
year................

My preliminary education was as follows:..

I spent..........................months in actual attendance at each of the following veterinary colleges: ....

My residence is..
(Post Office) (State or Province)

....
(Name in full) (Degree)

We, the undersigned vouchers, hereby certify that by reason of personal acquaintance or other reliable information, consider the above-named applicant a man of good moral character and reputable business methods.

....
(Name) (Degree)

....
(Name) (Degree)

Members of the American Veterinary Medical Association.

SECTION 6.—All applications for reinstatement to membership shall be submitted upon the form prescribed in Section five; shall be accompanied by nine dollars ($9.00) to cover the six dollars ($6.00) obligated at the time of suspension, and one year's dues in advance, and this sum shall be returned to the applicant should he fail of reinstatement to membership. All those obtaining their active membership by reinstatement shall within one year, sign the Constitution and By-Laws, as provided in Section ten of this Article.

SECTION 7.—All candidates reported favorably by the Executive Committee shall be balloted for by the Association. Those receiving a two-thirds vote of the members present shall become members of the Association upon signing the Constitution and By-Laws, as provided in Section nine.

SECTION 8.—Applications adversely considered shall not again be entertained until the next annual meeting.

SECTION 9.—A member-elect shall within one year sign the Constitution and By-Laws and be thereupon entitled to a membership card of active membership. If he fails to comply with this provision, he shall cease to be a member-elect.

SECTION 10.—Members who have been in active membership for twenty-five consecutive years and continuously thereafter until death or honorable withdrawal from the Association, shall be eligible to the Honor Roll of the Association, and shall be exempt from dues. It shall be the duty of the Secretary to report the names of members who are eligible to this list at each annual meeting of the Association. The list shall be referred to the Executive Committee for consideration and recommendation.

ARTICLE IX. HONORARY MEMBERS.

SECTION 1.—Any member may propose a candidate for honorary membership, the rank or station held by such candidate being stated in writing. The proposal shall be referred to the Executive Committee and considered by this committee at its next meeting. The Executive Committee shall then report its action upon said proposal to the Association, and, if favorably recommended, the person shall be balloted for by the Association at a subsequent session. A majority of votes cast shall constitute him an honorary member.

SECTION 2.—Not more than three honorary members shall be elected in any one year.

SECTION 3.—Honorary members may take part in debate, but shall not be entitled to vote.

SECTION 4.—The President of the United States shall be *ex-officio* an honorary member during his term of office.

SECTION 5.—The following shall be the form of certificate for honorary members:

This is to certify that the American Veterinary Medical Association has received..as an honorary member.

In witness whereof, these presents are signed by the President and Secretary, and sealed by our common seal this.........................day of.........................

....President.

....Secretary.

ARTICLE X. CONTRIBUTIONS AND ARREARS.

SECTION 1.—The active membership fee of this Association shall be five dollars.

SECTION 2.—The yearly dues of the Association shall be three dollars, payable in advance.

Section 3.—The Association, at an annual meeting, may assess such amounts as may be requisite to meet the necessary expenses.

Section 4.—Any member eighteen months in arrears shall be notified twice by the Secretary within six months, and if the arrears are not paid before the next annual meeting of the Association, the Secretary shall report said delinquent to the Executive Committeee for consideration of the question of suspension from membership.

Article XI. Order of Business.

Roll call.

Submission of the minutes of the previous meeting as presented in the annual report and in other records kept by the Secretary.

Unfinished business.

President's address.

Report of the Executive Committee.

Admission of new members.

Reports and discussions of other regular committees.

Reports and discussions of special committees.

Reports of officers.

New business.

Papers and discussion.

Election of officers.

Installation of officers.

Adjournment.

Article XII. Meetings.

Section 1.—The date and place of the annual meeting of the Association shall be determined by the Executive Committee. It shall be convened not earlier than August fifteenth nor later than the first Tuesday in September of each year, unless otherwise ordered by a two-thirds vote of the members of the Association, and notice of the selection shall be given to each member by the Secretary at least sixty days before the date of the meeting.

Section 2.—Special meetings shall be called by the President, or in his absence, by the ranking Vice-President, upon the written request of ten members, who shall specify the particular object of such meeting. A notice of such special meeting and its object shall be given at least one month before said meeting. The President is also authorized to call meetings at his discretion, the active members being duly notified as above.

Section 3.—At a special meeting no other business than that which shall have been specified in the requisition and in the published call for the meeting shall be transacted.

Section 4.—Twenty-five members shall constitute a quorum for the transaction of business, and a quorum shall always be presumed present at annual meetings unless an actual count be called for.

Section 5.—In the absence of the President and Vice-Presidents, the senior past President present shall preside. In case none of these should be present the Association shall elect a President pro tempore from the floor.

Section 6.—Every member shall observe order and decorum in the Association meeting, and shall pay due respect to the President and other officers and to his fellow-members.

Section 7.—All questions of order not specially provided for shall be decided by the usual parliamentary rules, Roberts' Rules of Order being taken as the guide and standard.

Section 8.—Unless otherwise ordered by the President, the work of the Association shall be divided into three daily sessions, viz.: from 10 A.M. to 12 M., 2 to 5 P.M., and 8 to 10 P.M.

Papers shall not consume in reading more than twenty minutes. Each discussion shall be confined strictly to the subjects of the paper or report before the Association. Each speaker shall be limited to ten minutes, and shall not speak a second time until all members who desire to speak shall have had an opportunity to do so. A member speaking the second time in the same discussion shall be limited to five minutes except by unanimous consent.

Section 9.—All resolutions presented to the Association shall be in writing and be referred without discussion to the Committee on Resolutions.

Article XIII. Code of Ethics.

Section 1.—Members of this Association are expected to conduct themselves at all times as professional gentlemen. Any flagrant violation of this principle shall be considered by this Association as a violation of this code and may subject the violator to suspension or expulsion.

Section 2.—No member shall assume a title to which he has not a just claim.

Section 3.—No member shall endeavor to build up a practice by undercharging another practitioner.

Section 4.—It shall be considered a breach of the code of ethics for a member to assail the professional reputation of a fellow practitioner, particularly for his own individual advancement.

Section 5.—In all cases of consultations it shall be the duty of the veterinary surgeon in attendance upon the case to give the opinion of the consulting veterinary surgeon (whether favorable to his own or otherwise) to the owner of the patient in the presence of all three. In case of the absence of the owner the veterinary surgeon consulted may, after giving his opinion to the attending veterinary surgeon, transmit it in writing to the owner through the medical attendant. It shall be deemed a breach of this code for a consulting veterinary surgeon to revisit a patient without a special invitation by the attending veterinary surgeon or agreement with him.

Section 6.—In advertising, the veterinary surgeon shall confine himself to his business address. Advertising specific medicines, specific plans of treatment, or advertising through the medium of posters, illustrated stationery, newspaper puffs, etc., will not be countenanced by this Association.

Section 7.—Any person who shall advertise or otherwise offer to the public any medicine, the composition of which he refuses to disclose, or who proposes to cure disease by secret medicines, shall be deemed unworthy of membership in this Association.

SECTION 8.—It shall be deemed a violation of the code of ethics for any member of this Association to contract with or through the officers of any live-stock insurance company for the professional treatment of the members' stock so insured; but this rule shall not prevent any member from becoming an examiner of risks and acting in the capacity of an expert for the same.

SECTION 9.—Each member shall observe the code of ethics adopted by this Association, and the President shall have power to summon any member to appear before the Executive Committee to answer charges for breach of the same.

ARTICLE XIV. SUSPENSION AND ALTERATION OF CONSTITUTION AND BY-LAWS.

SECTION 1.—Any motion for suspension of any article of the Constitution or the By-Laws, excepting as herein provided, must be offered in writing, be signed by the party making the motion, and must be adopted by a two-thirds vote of members present.

SECTION 2.—A By-Law may be suspended only for the purpose of facilitating important business of the Association, and the suspension must be of such a character that it cannot interfere with the vested rights or privileges of any member.

SECTION 3.—A suspension of the By-Laws may be made by unanimous consent of any meeting of the Association for the election of active or honorary members.

SECTION 4.—A suspension of the By-Laws may be made by a two-thirds majority for the purpose of changing the order of business.

SECTION 5.—All proposals for alterations or amendments of the Constitution or By-Laws shall be offered in writing. No alteration proposed shall be acted upon until it has been referred to the Executive Committee and presented anew by them to the Association. All members shall be notified at least ten days previous to any action thereon, and no alteration or amendment shall become effective except by a two-thirds vote of the members present at the time of the stated meeting.

PROCEEDINGS

OF THE

FIFTIETH ANNUAL MEETING

OF THE

AMERICAN VETERINARY MEDICAL ASSOCIATION

Monday Morning, September 1, 1913

GENERAL SESSION

The fiftieth annual convention of the American Veterinary Medical Association was called to order at the Hotel Astor, New York City, N. Y., on Monday, September 1, 1913, at 10.30 A.M., Dr. John R. Mohler, President, in the chair.

The President: *Ladies and Gentlemen:* The Fiftieth Annual Meeting of the American Veterinary Medical Association is now formally declared in session. It is indeed highly gratifying to me to see such a large number of members and visitors present this morning to attend this convention, and I sincerely trust you will all enjoy yourselves most pleasantly, and that we shall have a profitable and successful meeting.

We have with us this morning a gentleman who has shown his friendship for our profession on numerous occasions and I take great pleasure in introducing to you the Honorable J. A. Goulden, United States Representative in Congress from New York, who will deliver an address of welcome to this beautiful and prosperous city.

ADDRESS OF WELCOME

By Hon. J. A. Goulden
New York City, N. Y.

Mr. President, Ladies and Gentlemen:

This is an unexpected pleasure and a privilege that I am enjoying this morning. Last evening, at about half-past eight, one of my constituents got busy over the telephone. I sometimes regret that I have a telephone in my house. But he got busy, and as a consequence I am here this morning to take the place of the chief magistrate of this city, the distinguished Mayor, Honorable William G. Gaynor, not at his request, but at the request of my good friend, the gentleman who is sitting on the platform here with me this morning (pointing to Dr. Ellis). I regret exceedingly that his Honor, the Mayor, is not here, for I consider him one of the happiest men, that is, a man who makes the happiest speeches of any man I ever met, especially in extending greetings and a cordial welcome to the city. Whether it is too much politics, or the heat that is operating to keep him away, I do not know, but I know that unless he had been ill, or something important had occurred, he would have been here this morning to have greeted you.

It is a pleasure to welcome a body of ladies and gentlemen such as this to the Metropolis of the country. You are an intelligent body of men, and you are engaged in a work which is meeting the commendation of everyone who understands it, and which is gradually becoming better known. I am told that since you allowed the ladies to participate in your gatherings, that since you admitted them into the convention held some eleven years ago—and I believe I am right about that—that the attendance has been much larger, and that everything goes along smoother and better, easier and nicer. That is as it should be. You know that away back many years ago the Lord decided that it was not well for man to be alone, and so he created him a mate, and from that day to this we have always been delighted and glad to have the Eves with the Adams, not alone upon occasions such as this, but on every occasion. The fact is, we enjoy their presence and company.

The work in which you are engaged, is of that high order that it must of necessity commend itself to the American people. I regret that some people at Washington did not appreciate the bill which passed the House about a year ago giving the veterinarians in the army a rank. That bill passed the House, of which I am glad to be a member, and have been for about ten years, unanimously. It was sent over to the Senate, and I regret to say that a man from the far west pigeon-holed the bill. I liked it because I believe you are entitled to it. I believe you will never accomplish what you should, and what can be accomplished in the army unless veterinary surgeons are given some recognition in the way of proper rank by law. Now, they are simply looked upon in the light of non-commissioned officers, but with no standing whatever, and in order that they may do the work which is highly necessary they should do in the army, they must be given a proper standing. This is necessary not alone for the sake of the beast, but for the standing of the men as well, and until Congress gives them this rank I think you will not accomplish the work which you have sought to do.

Upon an examination of the exhibition at the other end of the building, I took notice of many interesting things and it has been to me a source of the greatest gratification as well as of study to feel that you are doing what I am convinced you are, for the uplift, not only of the dumb beast, but of the human family as well. It is my pleasure to be connected with two large institutions in this country, one an agricultural school, or college, and the other the State Soldiers and Sailors' Home at Bathe, and I note that through the veterinarians of the state we have accomplished a great deal of good in the eradication of tuberculosis from our large herds of cattle. I am firmly convinced (I am not undertaking to talk technically at all, because I know very little about the matter from that side) that the work in which you are engaged is not only of great benefit to the poor, dumb beast, but it is of exceeding great value and benefit to the human race. Both features of it are to be commended. Both are to be praised and both are entitled to the serious consideration of the world at large, and when your work is once understood, as it is becoming understood, you will have no trouble whatever in receiving that encouragement and assistance to which you are entitled. Your business today is entitled to recognition as a profession—a learned profession—because in your ranks are men of education, men of standing and men of character. Perhaps twenty-five or thirty years ago it might have been somewhat different. In those days the term "horse doctor" was considered as a fitting appellation for the veterinary surgeon. That has passed away. I have not heard that for a long time, and I therefore congratulate you that you are by your own efforts, by the beneficial character of the work in which you are engaged, and by the results which you have achieved, gradually forcing yourselves into the proud position with higher activity as members of a learned profession.

Now, we are sincerely glad to have you come to New York, a city noted for its great developments along all lines, noted for its commercial supremacy, noted for its institutions of learning, its schools and academies, its colleges and universities. New York stands well to the front, not only among the cities of America, but among the cities of the world, as a great commercial center, noted for its activities along all lines of human endeavor. Therefore, we are glad to have so distinguished and learned a body of men and women as are numbered among the members of this Association, present here today and we extend to you a cordial greeting. We bid you a hearty welcome, and we hope that your deliberations here will be of benefit not alone to yourselves but to mankind at large, and that you may go away from here feeling that New York City is a good place to visit, and that New York City is a good place in which to spend some time. Therefore, in the name of the people, I bid you a most cordial, a most hearty welcome, not only to our city, but to our homes, and to our hearts. Again, I bid you, everyone, a cordial welcome to New York City. (Applause.)

The President: I am certain that we all appreciate the cordial welcome which has been extended to us by Congressman Goulden, and I shall now call upon one of our oldest and most honored members of the Association, Dr. W. Horace Hoskins, to respond to this address of welcome.

RESPONSE TO ADDRESS OF WELCOME

By W. Horace Hoskins
Philadelphia, Pa.

Mr. President, Congressman Goulden, Ladies and Gentlemen, Fellow Members of the Veterinary Profession:

I deem it a special privilege this morning to be called upon to answer or to respond to this address of welcome to this great city of New York. I am doubly wedded to this great city and this great state in two particular ways. First, I am one of the graduates of one of the earliest veterinary institutions in this land, one that has spent its existence in this city; and secondly, I am wedded to this Association and to its great service for the public good, because it had its birthplace in this great city. New York has been, as a state, prodigal indeed in all that has pertained to the veterinary profession and in the relation of that profession to the people of this country. She gave it a private institution which was the first of the veterinary colleges that has maintained a continuous existence from its inception in 1857 up to the present time. New York was likewise one of the first states that has recognized her duty to her people and made the study of veterinary medicine possible by the establishment of two state schools. We have long recognized the duty of the state to take up as a part of her duty the support of veterinary education and veterinary science, because the work in which we are engaged is not one which promises affluence, to say nothing of competence in old age. It is a public service. We are engaged in the great work of extending animal industry, and the veterinary profession is having as a part of this service the control and eradication as well as the amelioration of the effects and causes of those diseases that are transmissible from the lower animals to men. In another way New York has been prodigal to the veterinary profession in this land in giving to it some of those men who have led the profession for more than fifty years. In sunny France there rests, in the evening of his life, Prof. A. Liautard, the founder of the first school in this city, in 1857, and the only living man who has had continuous membership in this Association from its inception in this city, in 1863, to the present hour; the one man above all others who has had deep in his heart the advancement and progress of veterinary medicine along the lines in which he established it. We are living today, fifty years after the birth of this Association, under the same code of ethics, and under the same ideals that he contributed so much to establish fifty years ago. We have no legal entanglements of any kind, but are bound one to another for the moral uplift of our profession and for its progress and advancement by the principles of conduct, which he was among the first to point out and establish. And in speaking of these, we must not forget that up in the central portion of the state there lingers another man in the evening of a well-spent life, Professor Law, another of the pioneers who early established a veterinary course in connection with Cornell University. He has lived to see as the result of his labor the growth of one of the strongest state veterinary schools that we have in this country. And so I might go on and speak of what New York has given to this country in the way of men from these schools who have borne such an important part in the advancement of veterinary medicine, and of their contributions to the success of the federal department established by the United States Government, the Bureau of Animal Industry, and to the success of the veterinary departments which have been established by the various state governments. New York has been prodigal indeed in its contributions to the advancement of animal industry, in the solution of those problems that have confronted the profession, and in the production of those men who have contributed so much to make the veterinary profession a respected and honored one wherever it is known, who were ready at all times for useful service in the uplifting of men of this profession and in the fellowship of its members, and in all the departments of great progress which this country has made along veterinary lines.

We are here today to celebrate our fiftieth anniversary. This golden occasion shows a membership on our roles of almost two thousand men, with eleven hundred men of our profession engaged in work in connection with the federal government and hundreds of others in state and municipal governments—all of them rendering a service to this country that cannot be mentioned in any monetary sense, because their work is for the protection of human life from infancy to old age. I am very thankful indeed to have this privilege of coming back to this city to renew all these pleasant reminiscences of my college days, and to think over anew the aims and purposes that were instilled in me here and that I have seen nurtured into the growth and advancement of this Association to a degree almost beyond that of any other science. I am delighted again to know that this progress has been largely made in its infancy, and its growth developed almost by the personal efforts of a large number of men who never lost sight of the duty which every man owes to his fellow-man in public service. And so when we meet here today, and think these thoughts mingling in our minds with these recollections of our progress, we should indeed be a happy and contented body. We have lived a life of public service in the interests of our fellowmen that commends our work not only to the people of our own country, where so much has been done for the advancement of our profession, but to all mankind all over the world.

THE PRESIDENT: I regret exceedingly to have to announce that owing to the serious illness of Mrs. Liautard our Honorary President will be unable to be with us to receive the courtesies which the Associa-

Courtesy of American Veterinary Review

PROF. A. LIAUTARD
Honorary President

tion has prepared to show him on this occasion. I am just in receipt of his cablegram, which I will take the liberty of reading.

"PARIS, FRANCE.

"PRESIDENT, VETERINARY ASSOCIATION,
New York.

"Your honorary president, between the sentimental duties that call him to America today and those terribly sad duties of family which would not permit his presence with you on this great occasion, begs to be excused for his inevitable absence. He hopes that no one will blame him, and that among his friends they will find the excuse that he asks in exchange for the very warmest wishes that once again, perhaps the last, he sends to the veterinary profession of America.

A. LIAUTARD."

We have also received a letter from Prof. Liautard enclosing his presidential address, together with a personal request from him as follows: "I trust that my address may be read by my partner for years, my old student, my sincere and disinterested friend, Dr. R. W. Ellis."

I therefore take pleasure in introducing to you this morning Dr. R. W. Ellis, who will read the address which was sent over from Paris by Dr. Liautard.

HONORARY PRESIDENT'S ADDRESS

BY A. LIAUTARD
Paris, France

Mr. President, Ladies and Gentlemen:

My Dear Confrères: When two years ago, I received from the President of the American Veterinary Medical Association the nomination of Honorary Chairman of your Committee of Arrangements to celebrate the fiftieth anniversary of the foundation of our national association, and when later I was told by the Acting Chairman of said Committee that I was expected to address you on "The American Veterinary Medical Association," my heart was filled with great pride and an uncontrollable joy. Great pride to have been selected among so many of you, better acquainted with each other, and where one could be found who would treat the subject in a far superior manner, with better words but not more friendly feelings than I would. And a great joy, as at last the imperious necessity and obligations, the almost unavoidable necessity that I had watched and looked for since years, had at last come to me: namely, that of being once more among you, with all my professional friends, with so many of my boys.

Why then am I not present on this occasion? Why then am I not here shaking your cordial hands, smiling at the pleasant recollections of happy days past and celebrating with you this great day of the fiftieth anniversary of our organization? Why am I not here?

There are in the life of a man, obstacles that come before him, interfere with all his wishes, paralyze all his efforts, kill all his plans, no matter what he may do, no matter what his hopes have been, his desires, his good-will may have planned, even when they have been prepared and entertained for years.

Such has been the case with me on this occasion. The great pride that your selection had awakened in me will remain but the joy of a moment. I must be deprived of it, and leave it to make place for a very sad and deep disappointment.

Let me then beg of you to excuse me, and ask you to believe that it is with a heart full of regrets that I have to be away, and to permit me to hand to one of my friends among you my reply to the subject.

Let me do it now, and as I have heard that speakers would be allowed but a short time for occupying the floor, I shall be concise. Anyhow, it is said that short speeches are always the best. I will try to be brief.

Having the advantage, if it is one, of being the only original survivor present at the organization of our national institution, with your kind permission, it will become me in replying to the subject "The American Veterinary Medical Association," to pass a concise review of her history. But in doing it, let me ask your indulgence. Fifty years is a good long lapse of time. Many events have occurred since. Our growth, our importance, the good that we have done, have increased as years have accumulated, and to speak of our origin and our progressive life, I have in my hands no official documents, almost no records. On my personal souvenirs I have to depend to tell how from a few, we have come to be the home of all those who today compose the American Veterinary Medical Association. If I commit any errors, if I omit some specific mention, I hope they will be overlooked and put on the account of an overfatigued and perhaps overstrained brain.

Gentlemen, the history of our grand Association can be divided into three periods. A first, beginning at its fundamental origin, involving birth, organization and early development. It extends from 1863 to 1889.

A second, which dates from 1890, when she reached the age of maturity, when she spread her influence and manifested her growth, her importance and reaches to 1898.

And a third stage, when in full development, when she has under her shelter not only almost all the states of this great Republic, but adds to her active membership veterinarians from beyond her frontiers. This period covers the time from 1898 to the present day.

In 1863, on June 9, a meeting was held in New York, in the old Astor House, in the lower part of Broadway. This meeting had been called by the invitation of some veterinary practitioners of Philadelphia. In the old minute-book of the Association will be found the first official reports of that meeting. As Secretary, I had the honor to enter them.

At the Astor House there were represented only seven states: New York, Massachusetts, Pennsylvania, New Jersey, Delaware, Maine and Ohio. And among the gentlemen who were present and had the honor to form the organization I may be allowed here to recall their names: From Pennsylvania, MacClure, Jennings, the two Rayner brothers, Michener; from New York, Dr. Large, A. S. Copeman, John Bustead, C. C. Grice and myself; from Delaware, Wisdom; from Maine, Flagg; from Ohio, J. C. Myers; from Massachusetts, Robert and C. M. Wood, Wm. and Robert Saunders, Ripley, Thayer and Josiah H. Stickney. I cannot remember who represented New Jersey, but anyhow the call had been acknowledged and properly answered. The gentlemen present were all veterinary practitioners, with few regular graduates. The first were self-made men, but their love for their profession was made evident by the earnest way that they manifested in answering the call for the meeting, in its organization, as well as by the energy and the real professional manner with which they carried on the work expected of them. You must bear in mind that in those days there were no American regular graduates in the United States, and that only a few foreign veterinary graduates were found here and there. The fact of their objects being successfully carried out by those self-made men, self-educated gentlemen, in their most minute professional acts and conduct, speaks highly of their efforts in behalf of our profession.

The meeting at the Astor House was not, however, specially called for veterinarians; others were present—physicians, agriculturists, and so forth, On the first day, the foundation stone was laid and on the second day the roll-call was signed by some forty gentlemen present. It is true that many dropped out after this call, but nevertheless the United States Veterinary Medical Association was born, was organized, its constitution carefully prepared, was adopted, a board of officers was elected with Dr. Josiah H. Stickney, M.R.C.V.S., graduate of London, as President, and a seal with a motto unanimously adopted, which for years afterward was applied on the certificates that were delivered to newly elected members. I do not know if it is so today. The seal represented a centaur. The motto read *Non Nobis Solum.*

When the meeting adjourned, it was expected that the original plans would be carried out and that semi-annual meetings would be held in New York and Boston, the first being the annual in September, the latter in March.

These semi-annual reunions were held very regularly. The discussion of papers, the presentation of specimens of pathological interest, records of cases, consideration of subjects of value and importance from a professional point of view and even some clinical work, occupied the time. And although the attendance was not always very large, the interest was never lacking. The enthusiasm remaining the same, the object of the Association was never lost sight of, and the earnestness and hopes of the members were always the same: namely, that the United States Veterinary Medical Association would one day become, *par excellence,* the bearer of the professional flag throughout the whole country.

And yet Boston and New York were the only places selected for the semi-annual meetings.

But times changed, the profession grew larger, schools had been opened, and were bringing out regular graduates. They wanted to join and did join the Association. If at the beginning the eastern states were principally prominent in the Association, others from the west had come, joined, and furnished many members.

A desire for greater magnitude was gradually manifested by all, and in remaining with the semi-annual meetings, as at the beginning, it seemed as if the U. S. V. M. A. was too confined. She was, so to speak, limited, one-sided, and her beneficial importance and influence arrested in their growth; and then having become of age, and reached her twenty-one years of good life, she made a grand effort, a valuable change, by deciding to hold thereafter the annual meetings in New York and semi-annual meetings in various cities in the country. Following the advice of Horace Greeley's at that time popular saying, "*to go west*," the U. S. V. M. A. went west, and held first an annual meeting in Cincinnati, which was followed successively by the semi-annuals at Philadelphia, Baltimore and Boston. In September, 1889, an annual gathering took place in Brooklyn.

Was there a semi-annual held after that? I have no recollection, no record of it. But I know well that at that time, the Association had reached her twenty-five years, and that she had gathered under her wing nearly as many states, having indeed representatives from Massachusetts, New Jersey, Pennsylvania, Connecticut, Rhode Island, Virginia, Maryland, Ohio, Nebraska, Maine, South Carolina, Delaware, Kentucky, Michigan, Illinois, Indiana, Wisconsin, Missouri, Minnesota and South Dakota.

We are far from the day of organization and the work that the U. S. V. M. A. has to her credit since the first meeting at the Astor House.

To review it even concisely would take too much time and wear out your patience. Think what you are today and judge of the difficulties she had to overcome! With the large number of states represented in the membership of the Association, she had certainly realized her first object and become the national veterinary body of America. Here ends the first period of her existence.

Gentlemen, we are entering in the second stage of the life of the U. S. V. M. A. If a little over twenty-five years have been necessary for the raising and growth of the organization, the second period will cover less time. Of course, the hardest part of the work has been done. We are in 1890, at Chicago, when the twenty-seventh anniversary meeting was held. But although it was that of the U. S. V. M. A., a greater name was in the minds, on the lips of many; it was a meeting of the great national association of the veterinarians of America, East and West, North and South. At that meeting we were then proud of our number, one hundred and twenty members having answered the roll-call.

And then we went on and held the annual meeting in Washington in '91, Boston in '92, Chicago again in '93 for the Columbian Exposition, where the meeting was also called for the first International Congress of American Veterinarians. We went in '94 to Philadelphia, to Des Moines in '95, Buffalo in '96, Nashville '97 and finally in '98 to Omaha.

During that period of eight years the semi-annual meetings were replaced by meetings of the Comitia Minora.

We have now arrived at the end of the second period of the life of the U. S. V. M. A. As I have already said it is not necessary nor is it possible to review the immense amount of good work that has been done, nor the enormous influence that the Association has had upon the elevation of our profession, the improvements in our colleges, the valuable changes, or how by her efforts and her will the education of veterinarians has been raised, extended and brought to the standing that it holds today. By the energy that she has deployed every branch connected with veterinary medicine has benefited, and all of us veterinarians can be proud of her. Read our professional journals, born of her bosom, and in them you will find recorded all her past doings, and tell me if she does not deserve well or our profession, and if we have not the right to look at her records with pride.

And now I must close these remarks, the U. S. V. M. A. is no more. She has changed her name.

The third period is now open.

We are in 1898 at Omaha. The old Association receives a second christening. She becomes the American Veterinary Medical Association of today.

Her history is but the continuation of her former life, and her membership is larger than that of any other similar body in the world. Her word is known, recognized and appreciated in every scientific veterinary center, for she will forever remain the solid representative of our profession in the new world. She has stretched her roots in every specialty of our branch of medicine. Civil practitioners who look after the health of our domestic and pet animals, agricultural veterinarians who look after the improvement of live stock and breeding, army veterinarians, sanitarians who protect the health of our citizens, milk inspectors who watch the food of our little ones, workers in their laboratories, investigators of the Bureau of Animal Industry, everywhere the A. V. M. A. finds many of her worthy members. It is true that some of our confrères are still laying off; they hesitate to join us; but let them have their time, make a little propaganda and no doubt they will come if we only show them that the Association has proved and will always remain true to her original motto, *Non Nobis Solum—"Not for us Alone."*

Mr. President, Ladies and Gentlemen, in closing these remarks with my sincere thanks for your kindness for having listened so attentively, while I glance back over fifty years and think of those good pioneers of our profession that were there and now are gone, permit me to ask you to join me in wishing the everlasting and constantly growing grandeur of the American Veterinary Medical Association, and with the poet say,

"Let her live long and prosper
And her shadow never grow less."

PRESIDENT'S ADDRESS

By John R. Mohler,
Washington, D. C.

Fellow Members of the Association and Friends:

Through your kindness it has fallen to my lot to deliver the Presidential Address in a year which will always be conspicuous in the history of our Association, and on a day which is intended to mark its semi-centennial anniversary. To have one's name enrolled among the thirty-three eminent men who have preceded me in this office is indeed an honor which naturally can come only to a few of the sixteen hundred who are numbered in this organization. At such a time our minds are necessarily occupied by thoughts of the past and of the future.

Fifty years ago there assembled in this city, a coterie of loyal members of our profession who founded the United States Veterinary Medical Association. This meeting took place in 1863 in the midst of the disturbing influences coincident with the Civil War, and was attended by a few veterinarians from each of seven states. Josiah Stickney was elected President and Alexander Liautard, Secretary. Of this loyal band of pioneers all save Liautard have passed from our activities, while he lives today to act as the Honorary President on this birthday anniversary. It is given to few men to serve actively as a member of any organzation for a period covering half a century, but this unusual experience characterizes the membership of our friend and colleague, Dr. Liautard, to whom we all extend greetings and best wishes on this natal day. The original meeting occurred on June 9 at the Astor House, when the nation was in the throes of civil strife and threatened dismemberment, and the armies of the North and the South were campaigning just prior to the great battle of Gettysburg. Yet in the midst of these frightful disasters, at a time when everything seemed in an irrevocable turmoil, there were found some indomitable veterinarians sufficiently resolute to brave the existing storm, sufficiently clear-sighted to prepare for the future. It was reserved for these men to be the first to conceive in wisdom and establish in strength an association qualified to meet successfully the purpose of the founders and to serve triumphantly as one of the pioneers of veterinary societies. Undeterred by the lack of numbers and unyielding to the clamor of radicalism, it has held fast consistently to a sane equilibrium and has demonstrated its merits by its survival. Remembering those who founded in wisdom and in faith and those who guided in loyalty and zeal, this glad half century of consistent and successful endeavor is looked upon by us all with unstinted admiration. In a short time, thanks to the feverish activity of the corps of practitioners who carried on the youthful association, there grew up a strong, sturdy organization. Meager as was the number of veterinarians who became charter members of this Association, it doubtless was as great in proportion to the available men as is the greatly increased number of colleagues who now avail themselves of the opportunities here presented for securing membership in the leading veterinary association in the world. The growth of this Association has been commensurate with the development of the nation. Its members have gone from its portals to take the lead in all movements for the development of veterinary science and its resources; they have been foremost in all actions having for their object the improvement of our profession and the betterment of animal life. And I doubt not that this great Association will go steadily and grandly forward keeping step with the onward march of humanity, broadening its work and increasing its usefulness throughout the years that are to come.

The acquirement of knowledge in the domain of animal diseases during the last five decades has been constant and amazing and compares favorably with the progress in other branches of science which has attracted the admiration of the world. As chemistry and physics have advanced from alchemy, and astronomy from astrology, so has veterinary medicine progressed from empiricism and become scientific. The most notable progress that has been made relates to the discovery of the class of infectious diseases and the mode of their conquest. As it is manifestly impossible in the time at my disposal to cover the details of development in all lines of veterinary medicine, it is deemed advisable to confine my remarks to the subject of infectious diseases, the study of which has done most to improve the health of domestic animals and at the same time to place our profession on a plane with the other learned sciences.

Coincident with the organization of the United States Veterinary Medical Association was the birth of our knowledge of pathogenic organisms, since the transmissibility of the anthrax bacillus by inoculation was discovered by Davaine in 1863. Two years later Villemin proved the infectiousness of tuberculosis and transmitted the disease from man to animals, while in 1867 Lister made his brilliant deduction that suppuration and septic processes in wounds were a species of fermentation which could be prevented by the use of germicides. The wonderful results of modern operative surgery have been made possible by the adoption of antiseptic and aseptic methods in the treatment of wounds and in the operating-room. One of the most important contributions to the study of infectious diseases was the introduction of the "plating" method with solid culture media by Koch in 1881. Other discoveries which greatly aided the progress of this science were the adoption of the Abbe illuminating apparatus, immersion lenses and aniline dyes for staining the bacteria. Beginning with the bacterium of chicken cholera, discovered by Pasteur in 1880, a number of pathogenic bacteria were described during the ensuing years in rapid succession. The more important of these were the great discovery of the tubercle bacillus by Koch in 1882, Pasteur's researches on swine erysipelas in the same year, the isolation of the bacillus of glanders by Loeffler and Schutz in 1863, and the discovery of the tetanus bacillus by Nicolaier in 1884. From this date until 1892 few important discoveries were made, most of the work done consisting in the perfection of the methods of investigation. However, the application of the newly-gained knowledge concerning pathogenic bacteria to the prevention and cure of these diseases was begun almost immediately. What a revolution in veterinary thought and practice has resulted can be appreciated only by comparing the text-books of twenty-five years ago with those of the present day. Pasteur working on the theory that resistance to a disease could be produced by causing a mild attack of the affection, was able to produce. immunity against a number of diseases of the lower animals. His classic experiments with anthrax vaccine are well known as is also his method of protection against rabies by the use of an attentuated virus. Similarly we take pride in the pioneer work of two of our members, Salmon and Smith, who, in December, 1885, began a series of experiments, the results of which clearly established the principle that the injection of sterilized cultures or dead bacteria confers active immunity to subsequent inoculation with virulent materials. Here then was the beginning of the foundation upon which rests our present knowledge of vaccine therapy that today is attracting so much favorable attention both for preventing and healing disease. The priority of this successful accomplishment was duly recognized by Hueppe in his writings in 1888, although the students of Pasteur made claim to the honor. Their work, however, was not begun until the following March. The general application of this method to therapeutics must be accredited especially to Wright of London.

Another very important principle which is so intimately associated with the names of Salmon, Smith and Kilborne, was the determination of the cause of Texas fever and the method of its transmission through the agency of the cattle tick. It is of interest to note that this was the first experimental proof furnished on the subject of diseases borne by insects, or diseases that can be carried from one animal to another only by an intermediary host. This mode of transmitting infections has since become quite familiar to the public by the discovery that certain mosquitoes of different species spread malaria and yellow fever to man. Other insects—flies, ticks, lice and fleas, have been found to carry infectious diseases from one person or animal to another, and the future may show that insects play a most important part in diseases other than those of which we have present knowledge. The discovery of the plasmodia, piroplasmata, and trypanosomes as causes of certain diseases of man and animals was the precursor of the enormous work which has been accomplished in establishing the relationship between various protozoa and diseases of man and animals. In 1903 Novy and McNeil succeeded in growing pathogenic protozoa in pure culture in a manner similar to the cultivation of bacteria. The discoveries of tuberculin in 1890 by Koch, mallein in the same year by Kelning, and tetanus and diphtheria antitoxin in the blood of animals injected with the toxins of these respective bacilli, are additional milestones in the history of veterinary science. The specific etiology of many diseases of animals still remains unknown, while others have been only partially elucidated by the discovery of the filterability of their invisible causative agents. The first of these filterable viruses was discovered by Loeffler fifteen years ago in the lymph of cattle affected with foot-and-mouth disease. At the present time fourteen diseases of animals are known that are caused by this class of invisible organisms. One of these is on the verge of visibility—the organism of contagious pleuropneumonia. As a rule this class of infections confers a high degree of immunity which is permanent. In some instances, as in rinderpest and hog cholera, it has been possible to produce an actively immune animal without thereby causing severe disease, by injecting the virus and at the same time the corresponding immune serum. This principle of simultaneous injection of immune serum and virulent blood was evolved by Kolle and Turner for rinderpest in 1898 and by Dorset, McBryde and Niles for hog cholera in 1905.

It is encouraging to reflect that the progress of bacteriology, like the progress of this Association, has been made by gradual and logical steps. The great discoveries, a few of the more important of which have been mentioned, were not lucky accidents but were planned and studied with great patience and deliberation. Their number has ever grown, and hence a new branch of knowledge has become available for the prevention of disease. This knowledge is being utilized largely for the diagnosis of communicable maladies, and for the application of measures of protection which previously had been dependent solely upon the clinical symptoms of disease. With the study of methods of conferring the power of resistance to the invasion of pathogenic bacteria, has grown the study of the processes of immunity. Such perfected methods are represented by the specific products which have reduced the dangers from rabies almost to zero, and the liability of tetanus after protective injections to a vanishing point.

New facts and conceptions of absorbing interest in immunity studies have been disclosed in an abundance and with a rapidity which is simply bewildering. The later developments are so abstruse and complex as to daunt all but the most resolute inquirer. Though we are still hardly beyond the threshold of the problem, the results already attained have compelled us to recast our views as to the very nature of infection and its prevention. Theory after theory has arisen and then has been swept aside, not to disappear utterly, but to be melted in the crucible of research till the refuse was burnt away. In 1884 Metchnikoff first published his famous explanation of immunity by phagocytosis, while it seems but yesterday that the striking researches of von Behring bade fair to explain immunity in terms of antitoxin. Then Ehrlich developed his schematic studies of the "side-chain" theory, which, though brilliant, was only a working hypothesis. But the march of time has shown that they are only a part of the whole truth. In fact the whirlpool into which these theories were leading us has been bridged by the recently developed theory of anti-ferments that appears to furnish us a more definite foundation for our explanation of immunity. We are still living within the era of its first achievements and therefore we may reasonably hope that this is merely the dawn of its beneficent results.

In proportion to our recognition of the fact that it is through ferments and toxins that bacteria exert their injurious power, the direction of research is changing and chemical examination is taking a large place in pathological inquiry. We now know that even when the actual bacteria have been destroyed by heat, the solutions containing them will produce toxic symptoms on injection in an animal or man. If the quantity is too small to produce serious symptoms it causes a reaction and antibodies are formed which counteract the effect of the living bacteria which are present or that may afterward gain entrance. This power of producing immunity is now becoming of very great practical service. One finds to a certain extent the same anti-power in relation to ferments. The active digestive ferments in the intestinal canal are rendered inactive during their absorption through the intestinal walls.

During the last few years certain objections have been raised to Ehrlich's theory of immunity on the ground that the results obtained by experiments do not harmonize with the suggested hypothesis. Abderhalden has proved by his studies that enzymes or ferments present in the blood play an important part in the economy of the organism, not only from the true physiological standpoint but also from a pathological aspect. He shows that all the processes which are going on in the organism are of a chemical nature, but are governed by certain physical conditions of the body cells and their substrats from which they obtain their nourishment. The chemical changes produced are gradual, not abrupt as usually supposed; and one or more enzymes take up the process of decomposition and synthesis where the other enzymes have ceased to be active. The actual processes noted in these changes are either reduction, oxidation, or hydration. When considered in the light of immunity, it is seen that these chemical changes may be protective or destructive in nature.

In this connection Abderhalden found that, after introducing certain foreign substances into the blood stream, enzymes were produced which acted specifically toward the foreign bodies. In other words, they destroyed or rendered them nontoxic. This shows a way in which the body protects itself against the invasion of foreign microörganisms. He also proved that under certain physiological conditions, as pregnancy, the blood serum contains substances which are capable of hydrolyzing the proteins of the placenta. Changes of a like character could also be noted in infectious diseases, such as tuberculosis and glanders and also in pernicious anemia of horses, while Rosenthal obtained the reaction in cases of carcinoma, nephritis and other diseases in man. The methods of noting the changes taking place are two, one which makes use of the polariscope in which the rotation of the serum of the subject when acting on a certain substrat is observed and the other utilizes the process of dialysis. In the latter case the end products produced by the serum when exposed to a certain substrat are detected by a chemical reagent. These findings are enough to show that a certain equilibrium exists among the enzymes present in the organism under normal conditions, and when once this equilibrium is destroyed other enzymes or anti-enzymes are produced or some of the enzymes present are increased in quantity.

Rothe and Bierbaum have recently published certain far-reaching results in the immunization of cattle with tubercle bacilli which appear to be of considerable importance to the study of immunity in tuberculosis. They aimed to find a method whereby larger amounts of tuberculous antibodies could be produced. For this purpose cattle were injected intravenously with variously treated tubercle bacilli and products thereof. A marked and prompt production of antibodies was noted which usually reached their height on the seventh day to persist into the second month, when a pronounced diminution or even total disappearance would take place. Quite similar results were obtained in the case of horses also. Having established conclusively that anti-tuberculous substances can be produced, the effect of repeated intravenous injections of dead bacilli was tested and the results indicate that a considerable protection against virulent bacilli can be created by this method. Perhaps the most important result of this work so far as immediate availability for practical use is concerned is that by means of the serum of such animals, which is rich in tuberculous antibodies, it may become feasible to test the various tuberculins, of which such a large number are offered for sale, for their actual content in specific derivatives of tubercle bacilli, by means of test-tube methods. We long have needed some easily applied test of this kind in order to exercise some control of commercial tuberculins, and it now seems that this may be possible.

The center around which both human and veterinary science revolve is comparative pathology. Most of the diseases observed in man affect also domestic animals and their course follows the same law. Comparison between constitutional and organic disease of man and animals is already a means of widening the circle and adding to science. The work done in the domain of infectious diseases has shown how advantageous and even necessary is the coöperation of the veterinarian and the physician. These infections have been thoroughly studied by competent men belonging to both professions, and one of the principal factors in this union is the honest conservative research work of many prominent representatives of our profession in all countries. In fact the growth of veterinary medicine is intimately connected with the progress of human medicine. Hippocrates, Aristotle, Celsus and Galen recognized the advantages which could be derived from the comparison of the diseases of men and those of animals. While they practised human medicine, they dissected animals and from the observations they made, derived a better insight into the diseases of man. It may be correctly said that all that was at that time known of human pathology was taken from animals and applied to man. In the middle ages the epizoötics and deaths among animals were ascribed to the influence of the stars, to the punishment of heaven, to sorcery or the Evil One. We can judge of the influence those ideas had on the people by what we see even in our day of such imaginary diseases as "Wolf-in-the-tail" and "Hollow-Horn." Then came the days when philosophical speculations were explained; it was the time of dogmas. Then medicine became separate from surgery and the latter being considered of inferior rank was consigned to the barber shops while veterinary practice was referred to the blacksmiths. This state of affairs continued until the first half of the nineteenth century. Isolated from other sciences veterinary medicine progressed slowly and contented itself with making sound practitioners. With the development of physical and natural sciences veterinary medicine entered on new paths and important discoveries were made. The erection of veterinary schools was becoming less infrequent and by degrees a profession of skilled veterinarians was established of which today we all feel proud.

One cannot contemplate the development of these veterinary institutions without a feeling of admiration in their achievements and a conviction that the phase of education which they typify is destined to become more and more important in America. The essential basis and foundation of a nation's welfare is to be found in its educational conditions. It is true that those abstract qualities which contribute to national greatness and patriotic citizenship are the offspring of ideals rather than of material things, but these can never come to their fullest fruitage without that substantial foundation afforded by rational and well-balanced educational forces. Humboldt, the German philosopher, has truly declared that "whatever you put into the state, you must first put into the schools," and it is equally true that the standing of the veterinary profession is dependent on the strength of its schools.

No one factor has been more successful in elevating the standard of veterinary institutions in America than the investigation of their curricula and equipment by the Bureau of Animal Industry in conjunction with the U. S. Civil Service Commission. While the primary object of such supervision was to make it possible for the Government to obtain men better educated and better qualified for its veterinary work, it nevertheless succeeded in raising the standard of veterinary education in the United States and enabled the students to obtain greater and better facilities for study. These schools have made large expenditures of money and have greatly augmented and improved their facilities. The Government had previously taken an active part in helping to improve veterinary education. When in 1894 the veterinary inspectors of the Bureau were placed in the classified service, it was necessary for applicants to be graduates of veterinary colleges. In 1899 a step in advance was taken when it was demanded that the graduate should be from a college having a course of not less than three years. Six months later this was changed to refer to graduates after 1897, while those before this date were eligible if from a two-year college. In 1903 a further stipulation was made to the effect that graduates from a college having a three-year course must have spent at least two years in the study of veterinary science. This prevented the colleges from giving two years' credit to students from agricultural, medical, dental and other colleges.

This Association likewise has been an aggressive factor in improving educational facilities in our colleges. Prior to January 1, 1893, it was possible for graduates of two-year schools to become members of this Association, but at that time the barrier was placed so that it was necessary for applicants to have graduated from a three-year school, having at least four veterinarians on the faculty. However, the two-year graduates of any school which adopted the three-year course could qualify provided they had been five years in actual practice. During the last two years the Association has had a committee on veterinary colleges at work inspecting and investigating the matriculation and course of studies in these veterinary colleges with an appropriation for expenses, and the results have well repaid the time and money expended. The various committees on Intelligence and Education have likewise given this subject faithful consideration, but systematic visitations of the schools were never undertaken. Another potent agency in the advance of veterinary teaching may be found in the establishment of the State Boards of Veterinary Examiners. These boards, which have been created in almost all the states, have set standards which have forced the colleges to meet them. The entrace examination now required by our schools is another factor in improving veterinary education by securing a better class of students who are more able to comprehend the various studies in the course.

Veterinary science will always be subject to reversals. Its progress has been and always will be a series of advances and retrogressions with the outposts of knowledge steadily advancing. All this but emphasizes the supreme importance of organizing inquiry on a thorough-going basis, coupled with a judicious conservatism in the formulation of conclusions. The broader and more tributary the field over which the collection of details is extended, the more certain is the scientific worth of the results obtained.

A lack of training in the fundamental principles is evidenced in the results from time to time reported of research work or investigations, as pursued by observers thus disqualified for the task which they have undertaken. Eternal warfare between truth and error is a record of the conflicts between knowledge and ignorance—conflicts that are oftentimes intensified by the inclusion of the personal element, leading to conditions that further complicate the problem and overshadow the main issue until all recognition of its importance is lost. But there is an important mitigating factor affecting the case of the man who, with the courage of his ignorance vehemently asserts that he knows. This factor is the honesty of his belief in the evidence of what he calls his own experience and his faith that what he himself has experienced cannot be wrong. It is, however, just that kind of faith that is earliest destroyed by systematic training in precise methods of scientific observations and reasoning. Research, so-called, has been carried to an absurd excess by men who have ventured alone into the scientific jungles with the hope of finding something, but without definite aim or fundamental knowledge or landmarks. It would seem advisable that no apparent discovery, made by a man who has not established a scientific status, should be accepted as such without a trial by a commission composed of scientists of established reputation.

It is quite generally conceded that the value of scientific discoveries and deductions is dependent upon their authorship. When new results are brought to our attention, the first inquiry is for the name of the author and several factors enter into our judgment of his work, but the primary consideration is the man. Unripe minds will naturally produce pseudo-science and much so-called science is being forced upon our attention today that is unripe and undigested. The personal side of research must begin with the proper training and preparation to conduct research that is worthy of the name and until we find the man fitted for this work, such accessories as money, equipment, apparatus, etc., cannot be efficiently applied. As an illustration of my theme that great things have been accomplished in the smallest quarters with primitive facilities, it may be interesting to know that the best research work accomplished by Prof. Ostertag was in a reconstructed hot-house, while Theobald Smith's renowned work on Texas fever was carried on in a poorly equipped garret of a four-story building. The goddess of science donates her treasures mostly to those who desire them for their own sake, and not for the sake of the riches they may bring. In these days of money-making invention we need a renaissance of the spirit which inspired and upheld the fathers of our profession in their strenuous labors, both scientific and practical, that have laid the foundations of modern veterinary medicine.

Professionally, we guard the greatest income-producing property in both the United States and Canada. Few appreciate the vast investment which we have in these countries in domesticated animals. There are, I believe, not less than five billions of dollars invested in the various kinds of domesticated animals in the United States, and on every side this vast investment is threatened by pestilence and disease. In fact, Government statistics will show that the loss of farm animals last year in this country alone comprised over six and a half million swine, nearly two million cattle, over two and a half million sheep, and more than half a million horses and mules—the total value exceeding two hundred millions of dollars. And it is the universal opinion of competent men who make a study of this subject that a large proportion of this loss can be eliminated by judicious sanitary measures. The greatest mortality is among swine. Something like nine-tenths of that is due to hog cholera; and cholera, though not absolutely preventable at present, can be very greatly reduced by judicious application of serum, together with proper sanitary control. The improvement and the protection of such interests as these are worthy of the most earnest consideration of both statesmen and scientists. This Association is working not only for the alleviation of the suffering and loss of domesticated animals, but also for the protection of the public health. We have in view both of these problems, and there are many diseases which we are investigating and endeavoring to control, the suppression of which will mean as much to the human race as it does to dumb creation, for which we are the especial guardians. Until recently our meat supply was ample with some to spare. Only six years ago we exported from the United States half a million cattle, and over four hundred million pounds of beef. Now exports have almost ceased, principally because of the home demand. We have only 23 cattle to the square mile, while Belgium has 164 and Denmark 144. However, any such intensive scheme of beef production is bound to be more expensive than the former methods of raising cattle on the vast grasslands of the open range. But some compensation may be had by saving even a part of the yearly preventable waste of food animals and thereby reducing the problem of high prices, for the consumer finally pays for the loss of animals that perish from disease, as well as for the healthy animals which are used for food.

A review of American veterinary progress would not be complete without some mention of the achievements of two Government Bureaus that are under veterinary direction and the activities of which are largely in the domain of veterinary science—the Canadian Health of Animals Branch and the United States Bureau of Animal Industry. In the relatively short periods of their existence these organizations have made a remarkable record, both in scientific research and in the administrative application of scientific knowledge and have thus thrown luster on the veterinary profession.

Veterinarians have always constituted a large proportion of the force of their employees, and at present in the Bureau of Animal Industry alone, they number 993.

If the scientific staff of the Bureau of Animal Industry had never done anything more than to make the classic discovery of the mode of transmission of Texas fever by the cattle tick, the Bureau's existence would have been amply worth while. This discovery established a new principle in medical science, the extent of the application of which the world is only beginning to realize as we learn to conquer in turn such maladies as yellow fever, malaria and sleeping sickness. It has made possible such triumphs of sanitary science as have been accomplished on the Isthmus of Panama, and without which the great canal could not have been constructed so expeditiously and with so little loss of human life.

In the prevention and eradication of animal diseases the Bureau has been of the greatest economic service. On several occasions it has saved the live-stock industry of the country from disaster and ruin. The immediate cause of the organization of the Bureau was the presence of contagious pleuropneumonia of cattle, which had been introduced in some way from abroad and becoming established in the Eastern States had spread as far as Illinois. It was after several years of effort that this insidious and stubborn disease was completely stamped out, and it has not since reappeared.

Twice the Bureau has had to deal with outbreaks of foot-and-mouth disease, first in New England and later in some of the Eastern and Middle Western states. Each time the disease was conquered after prompt and vigorous work by a well organized force of trained veterinarians and assistants. Even when we consider the experience of European countries that have struggled in vain for many years to get rid of this malady, it is difficult for us to appreciate the value of the work which prevented this infection from becoming established in this country, and from spreading to the great stock-raising regions of the west. In studying the origin of the latest outbreak, it was found that the infection was due to contaminated imported vaccine virus, and an interesting case of symbiosis of vaccinia and foot-and-mouth disease was discovered and demonstrated.

For many years the presence of cattle ticks and the infection of Texas fever have made it necessary to maintain a quarantine on cattle in a large area in the southern part of the United States. The movement of these cattle to northern markets has been permitted only under restrictions which entailed expense and lowered prices. The disease was a great disadvantage to the infected region and prevented the development of cattle raising there. The losses and damage have been variously estimated at from $40,000,000 to $200,000,000 a year. Applying the knowledge gained as to the nature of the disease, the life history and habits of the ticks and methods for their destruction, the Bureau with local help has during the past seven years waged a highly successful warfare of extermination against the ticks. The territory freed of infection in this time now amounts to nearly 200,000 square miles and almost equals in extent the combined areas of Tennessee, Georgia, Alabama and Mississippi. More than one-fourth of the territory originally infected has now been cleared, and we may look forward to the time when a great section of our country, naturally suited to cattle raising, will do its part toward supplying beef to feed our growing population.

Armed with an effective weapon against hog cholera in the preventive serum already mentioned, the Bureau has given battle to this disease, which for so many years has wrought havoc to the hog raiser. Systematic work has been started and with the experience of previous conquests it is not too much to hope that in time this work will also meet with success.

In tuberculosis we have the greatest problem that confronts veterinary officials. In the research work leading up to our present knowledge of this plague of animals and man, the veterinary profession has had a most creditable part, and the Bureau of Animal Industry has made valuable contributions to this knowledge. The task before us is to adopt administrative means which will repress and if possible eventually eradicate this disease from our domestic animals. The successful control of cattle mange, sheep scab, dourine and other infections are examples of similar veterinary achievements.

The United States Meat Inspection service constitutes the largest piece of veterinary administrative work in the world. Inspection is maintained at 786 establishments in 222 cities and towns, requiring the services of about 2500 employees, including a large proportion of veterinarians, who make all final decisions on post-mortem. A high standard of efficiency obtains and the results compare favorably with the service in other countries. It is interesting to note that in the attacks of 1906, no fault was found in any case with the veterinary work.

Taken as a whole the large number of employees constituting the great administrative body of the Bureau of Animal Industry are a conscientious and efficient force of men who deserve well of both the profession and the public, whose welfare they constantly guard. In their loyalty to the former they are necessarily loyal to the latter for their interests are inseparable.

By research and educational propaganda the Bureau has been a strong element in the general improvement in milk. The adoption of the score-card system of inspection and the advocation of pasteurization at 145° for thirty minutes, which does not injure the nutritive or digestive qualities of the milk, have been important factors in milk sanitation.

In these and many other ways the Bureau has given the world valuable scientific knowledge, has benefited humanity, protected health, performed economic service to stock-raising interests and reflected credit on the veterinary profession.

The increasing use of sera and vaccines in veterinary practice has made it desirable to obtain federal and state legislation in order to supervise the preparation of such products. Biological remedies have an important place in the field of sanitary medicine and this field is constantly becoming larger and more important. Some of these products, however, have been found to be frauds and a menace to the live-stock industry. It is, therefore, with much pleasure that I report the recent passage of bills regulating the sale of these products by the states of Alabama, Georgia, Pennsylvania and by the Congress of the United States. In Europe these products are prepared by private firms under state control as in Germany, or they are manufactured by the Government itself as in Holland. In the latter instance legislative measures are unnecessary.

That there is a promising future for this most recent branch of therapeutics may be frankly admitted, but there is a risk of allowing enthusiasm to outrun discretion in the claims which the advocates of these products urge in their favor.

It has been stated that the veterinarian of the future will be an immunologist. We all agree in hoping that it may be in his power to afford immunity to his patients from as many diseases as possible. But I submit that he must continue to be in the future as he has been in the past, above all things a man of wide clinical experience. No matter how great the advance of science may be in the future there never will be a royal road. to veterinary medicine. It will be the common road that all must tread who aspire to treat disease, and after the class-room has been left behind it will be through the stable, the farm, or the ranch, the post-mortem field, and the clinical laboratory, and will always lead back to the side of the diseased animal.

During the past year the spirit of our members and the energetic team-work of the officers and committees of the Association were highly commendable, and I wish to express my sincere appreciation of their valued services. I cannot refrain from mentioning especially the aid I received from our painstaking secretary and the indefatigable labors of the chairmen of the Legislative and Publication Committees. I have kept in close touch with the activities of the various committees, and I trust that their recommendations will be given careful consideration by the Executive Committee. The assignment of certain lines of work and investigation to special committees is an admirable arrangement and I hope that this method of apportioning the problems of the Association will be even further extended in the future. I do not deem it necessary to make any specific recommendations at this time as I am satisfied that you will give your earnest consideration to all matters which will be brought before you during the meeting, and in passing judgment on the different aspects of the subject you will always be guided by motives which will be for the benefit of our Association and the welfare of our profession.

I fain would speak of many other matters, but I have been warned not to trespass on your patience by speaking at too great length, and the warning is full of wisdom. However, before closing my address, it is fitting that I should pause, if only for a moment, to call to mind with affection and reverence those great men who honored and delighted this Association for years and who have conferred such high distinction upon the position of the veterinarian. I refer to men like Stickney, Michener, Large, Miller, the Rayner brothers, Andrew Smith, Huidekoper, Clement, Roscoe Bell, Pearson, Harger, Dougherty and many others. With what amazing industry, versatility and keenness of intellect did they unfalteringly cultivate the field of veterinary science! With what devotion and beneficial results did they give their time and abundant knowledge to the service of the public and of our profession! Today we mourn their loss but rejoice in the rich fruitage of their past friendship.

From the history of veterinary medicine let veterinarians draw confidence in the invincible strength of their science which though at one time despised even by the well-informed, has during the last five decades attained such great importance and such wide influence in the life of this and other countries. And let them take fresh courage and make new resolutions to rival all the other professions in useful work to be accomplished in the fifty years to come. Let them also remember with gratitude and veneration those not of our profession who supervising veterinary sanitation, early recognized the value of such control work and aided in its organization.

Today far-reaching questions of great importance are agitating the Association. Whatever be the outcome, let us hope that this, the greatest Association the members of our profession have ever seen, may in no measure depart from the high traditions it has ever set before it, but rather increase its usefulness to the profession and to the public.

Gentlemen, I have no fear for the future of veterinary medicine. I have an equally confident belief that in the times to come those who practise it will be held in increasing honor, and of him who is faithful to its high traditions it will be said, "Many shall commend his understanding."

THE PRESIDENT: I wish before any more persons leave the hall, that you would listen for a moment to the chairman of the Committee on Arrangements. He has an announcement to make.

DR. ELLIS: Ladies and Gentlemen: I have two announcements to make, and I hope you will not go away until you hear both of them.

In the first place, the ladies will meet the Auxiliary Committee in the Laurel Room at 2 o'clock on the main floor, 45th Street side, and will be from there escorted to the Steamship Lusitania, and I believe that that will prove to be a very pleasant trip for the ladies. Secondly, there is a gentleman at the secretary's desk that is here desiring to take a photograph of this gathering on the roof garden. No doubt, he will be in a position to tell you how to get there.

THE PRESIDENT: The next order of business is the roll-call.

SECRETARY MARSHALL: Mr. President, I move that the registration at the door be accepted in lieu of the roll-call, and that the calling of the roll be dispensed with. Seconded. (Carried.)

THE PRESIDENT: The next order of business this morning is the reading of the minutes of the previous meeting.

DR. MARSHALL: Mr. Chairman, I move that the Forty-ninth Annual Report be accepted as the official minutes of the last meeting. Seconded. (Carried.)

THE PRESIDENT: I am informed by the Secretary that there is no unfinished business, and therefore a motion to adjourn will be in order.

DR. REYNOLDS: I move we adjourn, Mr. President. (Motion seconded and carried.)

THE PRESIDENT: As there is no further business, we will adjourn until 8 o'clock this evening, when we will meet again in general session.

GENERAL SESSION

Monday Evening, September 1, 1913

President Mohler: Will the gentlemen please come to order? Before starting on the regular order of business, I wish to appoint Dr. Milks on the Finance Committee to take the place of Dr. H. Preston Hoskins, who I understand will not be present at this meeting.

The first business on the program this evening is the welcome to visitors and delegates by Dr. Harry D. Gill, of New York City.

WELCOME TO DELEGATES

By Dr. Harry D. Gill
New York City

Mr. President and Members, Delegates and Visitors:

The hospitality of this Association is proverbial. A formal address of welcome may well be considered superfluous, but celebrating our society's golden wedding day, an emphasized expression of sincere heartfelt welcome to delegates and visitors would be in keeping with the occasion.

This is a wonderful city, and our society is the best ever. Our local Committee of Arrangements "can't be beat," and each and every member of that committee feels, and wants you to believe, that he will cheerfully cater to your comfort and pleasure while you are here.

We want to make your visit to our city a memorable one; we want it to be an epoch in the history of the meetings of this Association, and we want you when you leave here to feel that you have not been neglected.

In conclusion, delegates and visitors, I want to say, you are all more than welcome.

President Mohler: The Chair would like to hear from any of the visiting delegates of the various veterinary organizations who may have been sent here with messages to transmit to this Association. I notice we have delegates representing the Bureau of Animal Industry of Chicago, Keystone Veterinary Medical Association, Maine Veterinary Medical Association, North Dakota Veterinary Medical Association, Pennsylvania State Veterinary Medical Association, Texas Veterinary Medical Association and the Virginia State Veterinary Medical Association. Is there any delegate from these or other organizations who has a message that he desires to transmit at this time? We will be pleased to hear from any such representative. If not, we will proceed.

DR. ARCHIBALD: *Mr. President and Gentlemen:* I have the honor to come here as the representative of the President and Directors of the Panama Exposition, to extend to you an invitation to meet in San Francisco in 1915. The Exposition people have assured me that they would supply everything in the way of a meeting-place and every facility for carrying on the work of this Association. They propose to erect an auditorium there, at a cost of something like a million dollars, which will be devoted to the purpose of holding meetings of the various scientific bodies and other organizations that may journey to the coast in that year.

The veterinary profession in California has not, as yet, taken any official action toward getting this organization to meet in California in 1915, I believe, but I can assure you that an official invitation will come in due time.

The Panama Exposition people are very desirous about getting an expression from this organization as soon as possible of their intentions regarding the acceptance of this invitation, and I would ask that this organization take some action before this meeting adjourns, so that we can carry back some kind of a definite message to the Exposition people. I have the honor and privilege of extending to the Association an invitation properly engrossed and bearing the seal and signature of the President and Secretary of the Panama Exposition.

DR. W. H. DALRYMPLE: Mr. President, we have with us tonight a very distinguished visitor in the person of the Honorable Martin Behrman, Mayor of the city of New Orleans. Mr. Behrman has heard a good deal about this Association, and he seems to have made up his mind to see for himself. Mr. Behrman is a man who is known, and favorably known, not only in the entire municipalities of the South, but all over this great country. Mayor Behrman has come with a message from the South to this Association, and with your permission, if there is no objection, I would bespeak for him the privilege of the floor for a few minutes to hear the message that he has.

PRESIDENT MOHLER: If there is no objection, the Chair will gladly give Mr. Behrman the privilege of the floor. Mayor Behrman, I extend to you the privilege of the floor.

MAYOR MARTIN BEHRMAN: *Mr. Chairman and Gentlemen of the Convention:* Dr. Dalrymple is absolutely correct. The profession that he represents and you all represent is well represented down in our section, and they are here today in the presence of Dr. Moore, Dr. Douglass and Dr. Dalrymple. They told me they were going to be in New York at a great convention representing their profession, and they said that we ought to get that convention to come to New Orleans. I want to say they have not been mistaken. It is a great convention, and if you gentlemen were not too modest, I was going to say it was composed of handsome and distinguished-looking gentlemen.

My friends, there was a time when New Orleans would hesitate about asking a convention to come there. New Orleans is one of the oldest cities in the country. You know of her trials and tribulations. The war and the consequences that came after the war were something that it took a brave people indeed to come through; but we have a great city now, a city we are proud to ask visitors to come down to, and our people are asking the people of the world to come down and visit New Orleans and see what the people "Way Down South in Dixie" are doing. You know the great bulk of the people who are busy trying to make money, do not have time to stop and play. They think that things down where we live are slow and easy, and we are a kind of people who are satisfied to let well enough alone. That may have been the case. Nature has been kind to our people down there, things do come very easy, but there is a new generation who do not believe in letting well enough alone, but who believe in doing things. And they are doing it, my friends. While we take off our hats to New York, and say "That great city of New York," yet I want to warn New York to be up and doing, because, with the opening of the great Panama Canal, we believe that that city by the Gulf will be one of the greatest cities in the country and we believe if she does not eclipse New York, she will come mighty near doing it.

There is a new awakening down South in Dixie; they are up and doing. Why, take it down in the great city of New Orleans which I have the distinguished honor to represent, my kind people (and I say it because they have been very kind to me) for three successive terms have elected me Mayor. You might say their judgment is not good, but I think it is.

I was born in this great city of New York, but I knew that was a mistake. And when I came to a sense of reasoning (seven months old), I left New York and went down to New Orleans. Because I knew that New Orleans was destined to be one of the greatest cities in the country.

I said in the beginning that there was a time that we would not ask people to come down there because we were not in a position to do it. The war, as I have said, reconstruction, pestilence and floods we had to contend with. War and reconstruction have been forgotten. There is now, so far as we are concerned, no North, there is no South, there is no West and no East. There is one great united country. Pestilence, by the aid of the federal authorities, has been conquered. Yellow fever, that came to us practically every year and closed us up as though we were some foreign foe, we no longer dread. We know how yellow fever originates, and we know how to treat it after it comes to us. It does not matter any more, and you need hesitate no longer coming down to New Orleans on account of yellow fever.

Seven months ago a case of yellow fever came from Rio. On board ship was a cargo of coffee consigned to New Orleans. The ship stopped at quarantine less than a hundred miles away. Under the old conditions it would have shut our doors but what happened under the new conditions? That patient was taken off, put in the quarantine station, in a screened room, treated scientifically, got better, was sent back to Rio, and nobody thought a thing about it. It has no more fear for us than an ordinary toothache and it cannot matter, because we are now being treated just like all the rest of the country. The great United States Government, of which we form a very important part, has taken care of our quarantine service and the quarantine regulations at New Orleans are the same as they are at New York, the same as they are at Texas, the same as they are in any part of the country, and that is what we ask for, and all that we ask the Government, is to treat us the same as any other section of the country.

Now I knew then, as I said (I do not like to say how old I am for it is a long time ago when I was seven months old), but I knew then that New Orleans was going to be a great city, and our people are beginning to appreciate it, and they are getting ready for it. You want to look at the health statistics, and, my friends do not take my word for it, but look at the Federal Government statistics, and you will find today New Orleans is the healthiest city in the United States, and that cannot be contradicted, because the federal statistics will bear me out.

Then take the weather report about weather conditions. Why, my friends, when they were being prostrated by the heat here in the streets of New York, we were walking around unconcerned, and feeling as cool as any section of the country. And don't take my word for that, but take the report of the U. S. Weather Bureau, and they will bear me out. You know New Orleans is known as the winter capital of America, but we are going to change it—that is, we are not going to change it, but we are going to add to it—we are going to call New Orleans the summer capital of America. Now, of course, to some of you that may be a little bit far-reaching, and may look like we are stretching the limit; but I ask you to investigate the Federal Government reports of the weather bureau, and you will find that what I am telling you is the absolute truth. Heat prostrations in New Orleans are unknown. On the north are the waters of the Mississippi, the Gulf is on the south, and Lake Pontchartrain is behind us. There is not a night in the year you cannot sleep.

When we ask you to come to New Orleans we are going to ask you to come to a city renowned for its hospitality. In the maddening rush for wealth our people have never forgotten old-time Southern hospitality, and when the Mayor delivers to you the keys of the city and bids you welcome to New Orleans, it is not figuratively speaking, but it is the key that opens the hearts and homes of the people in New Orleans who are always glad to welcome the stranger whoever he is.

Then when you come to New Orleans you are bound to have a good time. Why there is not a city in the country where the people would stop and play as we do there. You ought to come down there during the carnival of the Mardi Gras, for two or three days or for a week, when people set aside their business and cares, and you see a great big city, as it were, at play, a great big city at play for two or three days in the week. There is not any country or any city anywhere that knows how to entertain the people, and who are doing it more cheerfully than the people of New Orleans.

Now my friends, there is much to interest you in New Orleans. New Orleans is one of the oldest cities in the country, with a great wide street, Canal Street, which is the dividing line between the French and American quarters, dividing the old from the new. You must see the architecture of the old buildings of New Orleans. You must stand within the ancient Cabildo where was written so much of the history of Louisiana, and where Louisiana was transferred from France to the United States; you must wander through the deserted corridors and through the French quarters. Below you will find new streets that are even celebrated there now; you will find a new and hustling city filled with people that are doing things.

Then you will find what we are doing for the health of the city. We have the most magnificent water-plant system and water filtration in this country. We take the old muddy Mississippi, and we turn it out to our people as clear as crystal. By the way, I want to warn you, because I do not want to take any advantage of you, for I know you are coming, and we want you to come again. They say, "Once you drink of the Mississippi water you shall always return." Let me tell it to you in French like we talk it down there, for I know you all understand it, and that is the reason why I say it to you. They say, "Quand vous aurez bu une fois seulement de l'eau du Mississippi, vous reviendrez toujours." Which, translated into the language we have been talking tonight, means, "Once you have drunk of the Mississippi water, you shall always return." For that reason, I always insist upon a stranger coming to New Orleans drinking at least one glass of water. We always insist on one glass, because we know you will come again.

In talking to you now from the cold business side of it, we want you to see a city which is preparing for things. We have the most magnificent harbor in this country that belongs to the people. It does not belong to any corporation; no corporation has any private rights along the river front. We own it all, it belongs to our people, and on that wharf we have magnificent steel sheds that belong to the people, and no ship has a right to land there and accept a preferential rate. Only one rate is given to all steamers that want to enter into the port. Connecting those wharves we own our own railroad, and we handle cars of all the railroads every day, and let me tell you the history of that road, if you will pardon a little bit of a personal matter in which I take a good deal of pride, because it was all built during my term of office. Before the building of the Gulf Railroad (and New York, as big as she is, sent down a committee to investigate how New Orleans built that railroad) if you had a carload of merchandise shipped and consigned to an industry along the river front, and it did not originate on one of the lines that had track rights on the river front, you could not tell when you would get your car, and they would charge you eight to ten dollars a car for beltage. What is the case today? We handle cars every day. Then they said the city did not know anything about running a railroad, and could not do it, We never believed we would make any money on the railroad, but we have been so successful since the building of the road, even at the low price of two dollars a car, that we have been able to sell $300,000 worth of bonds at the opening of the road.

There is a public utility wharf on the river front that we want you to see, because it is unique; there isn't another in this country; and I believe you gentlemen represent every section of this country, and you would be in a position to contradict me if it is not true.

Now for a side trip, if there is one thing that the traveller wants especially to see, it is the Panama Canal, and I am here to assure you, on behalf of the agents in New York of the United Fruit Company, that a special rate will be given to the delegates from New Orleans to Panama and return.

There is so much to see down there besides the city. It is a wonderful city. Do you know, my friends, in the State of Louisiana there is the greatest sulphur-producing mine in the world, producing more sulphur even than the mines of Vesuvius, and it is only eight or ten miles out of New Orleans. We have great salt mines, producing more salt than any other mine in America, but six hours' ride out of New Orleans.

Then there are the great fishing and hunting resorts; no better fishing and hunting anywhere than down in that section.

Then we produce more lumber; we have produced more lumber in the last three years than any state in the Union except the State of Washington.

And then the oysters! We have fish and oysters, and I wish I was down there now eating some. I wish you were down there to join me in the dishes they serve. Oh, my friends, if you could go down there and eat a plate of boule-bas and all those things, and our chicken gumbo and our soft-shell crabs, you will never want to go away from New Orleans! And so, my friends, I invite you to come to New Orleans, come to the state of Louisiana, come to a city renowned for its hospitality. On behalf of all of our people, I guarantee you unlimited hospitality and a good time to all of you who will come down.

Dr. Dalrymple: I know Mayor Behrman will go away satisfied that this is one of the greatest conventions, and that is what I wanted to get Mayor Behrman here for.

I remember, in 1904, at our convention, that Professor Tsuno from the University of Tokio said that Japan had the largest veterinary society of any organization in the world at that time, 1000 members, and here now we have 100 per cent. more than that, close upon 2000 members of this organization. So, Mr. Behrman, you can say in truth that this is the greatest organization of the veterinary profession in the whole world. I hope you will tell your people that this is one of the greatest conventions in the world.

I want to give you on behalf of the veterinary profession in the South just as warm and sincere a welcome to New Orleans for the year 1914 as I possibly can. This is the fiftieth anniversary of this Association. It has met once south of the Mason and Dixon line in fifty years. It is due to us in the South to come down there as a matter of missionary work. I don't believe you will find any more loyal supporters than you do from the Southern states connected with this organization. I believe I can say that, although our number of veterinary graduates is not very large in the state of Louisiana, yet relatively the proportion is more than any state in the Union in membership in this Association. The opening up of opportunity for members of the veterinary profession is becoming very great. Perhaps some of you, if you keep your eye on Congressional matters, have noticed that the prospects are that the sugar industry will be considerably diminished in size. That means that our sugar plantations will be going in for diversified agriculture, including live-stock. In fact they are starting out very seriously now. As the years go by the increase in live-stock will be very immense in the state of Louisiana, and will require the intelligent aid and assistance of members of the veterinary profession. They are coming in gradually; there are more men passing the examination. A body of men like this, planted down in the city of New Orleans, would do more for the profession down there than any one could conjecture. They have no idea about it. In almost every place we go to, the statement is made, "I am surprised to see such an intelligent body of men representing the veterinary profession." I have heard that at conventions many times, and at many conventions, and I believe there had been no conception of the class of individuals that were engaged in the treatment of diseases of animals. We make a splendid impression everywhere we go. I know that you would get a splendid welcome from the State Medical Society of Louisiana, of which I have the honor of being an honorary member, because we have always been in close touch with contagious diseases, and in touch with the work of the State Board of Health. I know there is a warm welcome awaiting us down there, and, as I say, it would do more good than anything else possibly could, not only to the people down there, but it would do lots of good to our members to see that section of the country. I hope when the time comes you will consider favorably the invitation to Dixie, and to Louisiana for 1914. It is time you should come, you owe it to us; it is a matter of duty, really, for this organization to assist us in the South in trying to do what we are trying to do for the benefit of the profession down there. I am much obliged to you, gentlemen.

Dr. Mohler: Are there any other delegates to present reports at this time? If not, we will proceed with the regular order of business.

The next item is the report of the Executive Committee, Dr. Stewart, acting chairman.

Dr. Stewart: Mr. President, the Executive Committee work is not sufficiently completed to make a report this evening. We will hold another session tomorrow morning, and then we expect to be able to make a report.

President Mohler: The report of the Secretary, Dr. Marshall, is now in order.

Secretary Marshall: Mr. President and gentlemen, with your permission I would like to cut out the first part of my report, which has to do principally with statistics and bookkeeping which I fear may bore you if I should read it to you, but I hope you will be interested enough to read it in the annual report. I have a few recommendations that I would like to make, and I will read this part of my report.

REPORT OF THE SECRETARY

C. J. Marshall
Philadelphia, Pa.

The membership of the Association is made up as follows: Honorary members, 25; honor roll members, 31; active members, 1594; making a total of 1650. The membership and the applicants of this year are divided in the different states and provinces as follows:

	Members.	Candidates.
Alabama	10	4
Arizona	2	1
Arkansas	3	
California	107	13
Colorado	29	
Connecticut	26	5
Delaware	3	2
District of Columbia	30	3
Florida	4	
Georgia	6	2
Hawaii	2	4
Idaho	6	
Illinois	108	4
Indiana	106	8
Iowa	55	7
Kansas	41	4
Kentucky	17	1
Louisiana	16	1
Maine	7	4
Maryland	21	2
Massachusetts	53	1
Michigan	59	8
Minnesota	53	4
Mississippi	8	3
Missouri	57	6
Montana	13	3
Nebraska	49	1
Nevada	4	1
New Hampshire	4	3
New Jersey	29	9
New Mexico	12	
New York	96	43

	Members.	Candidates.
North Carolina	14	
North Dakota	45	11
Ohio	80	9
Oklahoma	3	1
Oregon	16	2
Pennsylvania	126	37
Philippine Islands	22	6
Porto Rico	1	
Rhode Island	6	
South Carolina	4	3
South Dakota	29	1
Tennessee	13	1
Texas	20	4
Utah	11	
Vermont	5	9
Virginia	15	1
Washington	22	6
West Virginia	6	2
Wisconsin	49	2
Wyoming	5	1

	Members.	Candidates.
Canada.		
Alberta	14	2
British Columbia	13	2
Manitoba	15	5
New Brunswick	1	
Nova Scotia	2	2
Ontario	23	2
Quebec	8	3
Prince Edward Island	1	
Saskatchewan	12	7
Other Countries.		
Australia	2	
England	1	
Ireland	1	
Jamaica	1	
South America	1	
Norway	1	

Total membership, honorary and active, 1913, 1650.

Number of members resigned during year	1
Number of members died during year	6
Number of members dropped for non-payment of dues	48

Mail has been returned during the year from the following members:

Edward H. Aicher, Agricultural College, Miss.
Warren J. Embree, Aberdeen, S. D.
E. W. Hagyard, Portland, Oregon.
A. G. Hatterscheid, Aberdeen, S. D.
D. W. Hurst, Pierre, S. D.
Albert C. Johnson, Portland, Ore.
James S. Kelly, Cleveland, Ohio.
J. A. McKinnon, Toronto, Ont., Canada.
R. D. MacIntosh, Winnipeg, Man., Canada.
J. W. Nicholson, Chicago, Ill.
Richard H. Power, Portland, Ore.
A. C. Rosenberger, Sacramento, Cal.
R. A. Stephens, Cincinnati, Ohio.
James Sullivan, Vellejo, Cal.

The following have been in active membership for twenty-five consecutive years, their dues are paid up to date and they are therefore eligible to the honor roll: Cooper Curtice, Daniel Emerson, J. H. Jacobus and A. D. Melvin.

Dr. F. C. Grenside has tendered his resignation to take effect September 1, 1913. His dues are paid to date.

The following have been reported deceased since the last annual meeting: Drs. Arthur P. Brown, T. Earle Budd, William Doughtery, Gerald P. Dillon, R. W. Hewett, George S. Baker and Walter McHenry.

The Secretary's books show the following financial condition for the year ending August 23, 1913:

Amount of dues outstanding August 15, 1912	$4056.00
Dues of 1594 Active Members at three dollars each	4782.00
Amount to be collected during the year	$8838.00
Less dues of 48 members dropped owing nine dollars each	432.00
Leaving a balance collectible for all dues to date	$8406.00
Amount actually collected for dues during the year	4170.00
Leaving a balance outstanding of	$4236.00

The outstanding dues are distributed as follows:

76 members owe nine dollars each	$684.00
145 " six "	870.00
894 " three "	2682.00
Total	$4236.00

The total receipts during the year were as follows:

Receipts for dues at Indianapolis Meeting	$396.10
" applications at Indianapolis Meeting	484.00
" applications since September 1, 1912	1863.10
" dues since September 1, 1912	3775.25
Received from W. L. Williams, Librarian	14.50
" M. H. Reynolds (overpayment of bill)	2.70
" Republic Trust Co., interest on deposit	6.75
" Member for contribution	3.00
Total	$6545.40

The amount of $6545.40 includes $8 which is due from L. E. Olson, Portland, Oregon, covering amount of check returned by the bank. The total receipts deposited and on hand are therefore $6537.40.

Disbursements

Nov. 30, Check to G. R. White, Treasurer	$2150.00
April 14, " " "	515.00
May 12, " " "	2.70
July 17, " " "	300.00
Aug. 13, " " "	3000.00
Total	$5967.70
Balance in Bank as shown by Bank Book	506.17
Checks and money orders on hand not deposited	60.00
Grand total	$6533.87

The amount of the vouchers turned over to the Treasurer for payment for the year ending August 26, 1913, was $6303.67

The Association has members in every state in the Union, and also in Hawaii, Philippine Islands, Australia, Brazil and nine of the Canadian Provinces. In this year's applications are petitions from veterinarians of thirty-six states, Hawaii, Philippine Islands and seven Canadian Provinces. The Association has become truly an American Veterinary Medical Association. The influence of this organization for good is growing rapidly each year.

New responsibilities are materializing rapidly and it will require an extra effort on the part of the officers and members to keep up with this progress in the future. With the membership at practically 2000 and dues three dollars a year it is possible to manage the affairs of the Association in such a way that the running expenses can be paid. There are good reasons for doing more than has been done in the past, and to do more it will require more money.

The work that should be done by the Secretary is sufficiently great to require all the time of a good man. A permanent office should be established for him where his records may be conveniently filed and his duties discharged in a business-like manner. More room is now required for reports, records, etc., than can be expected to be furnished free by a private individual or a public institution.

The work of editing and publishing the Annual Report has become a difficult task. It is doubtful if a person can be found much longer who can look after this work in connection with outside duties, and do it as well as it has been done in the past. Would it not be well to combine the work of the Secretary, Librarian and Chairman of the Publication Committee and employ a capable person on full time to attend to these duties? The Annual Report is becoming large and cumbersome. Would it not be better to issue Quarterly Bulletins in place of the report?

It was suggested last year that the Sections should be organized. It is hoped that arrangements will be made this year for their organization. We have four Sections at present, with no organization with the exception of one. In addition to the Sections we have at present we should have one on Animal Husbandry and one on Bacteriology and Pathology. The present Section on Sanitary Science and Police should handle the question of National, State and Provincial Sanitary Control Work. Many of our members are interested in the laws and regulations for handling live-stock in the various states and provinces and a Section should be devoted to this kind of work.

Our Association should be prepared to take care of all the Veterinary Sciences and the Secretary offers the following suggestions:

1. Raise the annual dues from three to five dollars per year.

2. Combine the duties of Secretary, Librarian and Chairman of the Publication Committee into the position of Secretary for a term of years.

3. Provide an adequate salary to obtain the services of a person qualified to fill the position of Permanent Secretary.

4. Provide for the publication of a Quarterly Bulletin to take the place of the Annual Report.

5. Provide a permanent office for the Secretary with room sufficient to file reports, records, etc., and store the other property of the Association.

6. Arrange for the organization of Sections.

7. That local committees be limited in the future to spending a sum not to exceed $1000 for entertainment.

The Secretary wishes to thank the Directors of the different Sections for faithful services contributed in providing the program before you. He also wishes to express his appreciation to the members for the confidence and patience extended in the past. On account of the vast amount of work that should be done by the Secretary and the fact that practically all the time of the present incumbent is demanded in other lines of work he desires to be released from further duties in this office.

PRESIDENT MOHLER: Gentlemen, you have heard the report of the Secretary. What is your pleasure?

A MEMBER: Mr. President, I move the report be accepted and referred to the Executive Committee.

(Motion seconded and carried.)

PRESIDENT MOHLER: The next order of business is the report of the Treasurer, Dr. White.

TREASURER WHITE: Mr. President and Gentlemen of the Association: As Treasurer it gives me pleasure to report that the total receipts for the year have been \$9351.67. The total expenditures for the year have amounted to \$6189.44. We have on hand at the present time \$3162.23.

Now for the last several years past I have made it a practice to have printed and distributed at each one of these annual meetings a detailed itemized report of all receipts and all expenditures. I do not know whether this is a wise practice or a wrong practice, but I do know that, so long as I am Treasurer of this organization, every man in it shall know exactly where every dollar of the money is spent. This report has been distributed at the Secretary's desk during this meeting, and I hope all of you have supplied yourselves with a copy. If you have, you can look over it for the items of expenditure, and I am sure you will find out where the money has gone. I thank you very much.

REPORT OF THE TREASURER

GEORGE R. WHITE
Nashville, Tenn.

RECEIPTS FOR 1912–13

1912			
August	26,	Balance in bank as per last report	\$3207.09
December	5,	Received from C. J. Marshall, Secretary . .	2150.00
1913			
April	7,	Received from C. J. Marshall, Secretary . .	176.88
April	17,	Received from C. J. Marshall, Secretary . .	515.00
May	14,	Received from C. J. Marshall, Secretary . .	2.70
July	20,	Received from C. J. Marshall, Secretary . .	300.00
August	20,	Received from C. J. Marshall, Secretary . .	3000.00
		Total receipts, 1912–13	\$9351.67

DISBURSEMENTS FOR 1912–13

1912			
August	30,	To Charles F. Roberts, New Haven, Conn., for amount advanced on account of stenographic services	$200.00
September	5,	To John W. Spence, Philadelphia, Pa., for printing, by C. J. Marshall, Secretary	487.42
September	5,	To Western Union Telegraph Co., Philadelphia, Pa., for four telegrams, by C. J. Marshall, Secretary	3.61
September	5,	To A. G. Smith, Portland, Ore., for membership fee and dues returned	8.00
September	5,	To Tom Carpenter, Alameda, Cal., for membership fee and dues returned	8.00
September	5,	To W. F. Crewe, Devil's Lake, N. Dak., for expenses as Resident Secretary	4.00
September	5,	To C. E. Steel, Oklahoma City, Okla., for postage and stenographic service for Committee on Legislation	5.50
September	5,	To F. A. Rich, Burlington, Vt., for expenses as Resident Secretary	2.30
September	5,	To I. E. Newsom, Fort Collins, Colo., for expenses on Army Legislation Bill.	3.50
September	5,	To B. T. Woodward, Washington, D. C., for expenses as Resident Secretary	1.30
September	5,	To John F. DeVine, Goshen, N. Y., for expenses as Resident Secretary	43.60
September	5,	To A. Bostrom, Lincoln, Neb., for expenses as Resident Secretary	7.50
September	5,	To A. D. Knowles, Livingston, Montana, for expenses as Resident Secretary	3.00
September	5,	To W. Dean Wright, Portland, Ore., for expenses as Resident Secretary	5.30
September	5,	To K. W. Stouder, Manhattan, Kas., for expenses as Resident Secretary	7.00
September	5,	To L. N. Reefer, Wheeling, W. V., for expenses as Resident Secretary	2.10
September	5,	To A. Joly, Waterville, Me., for expenses as Resident Secretary	1.00
September	5,	To M. J. Ragland, Salisbury, N. C., for expenses as Resident Secretary	2.34
September	5,	To W. G. Clark, Marinette, Wis., for expenses as Resident Secretary	12.50
September	5,	To David McKibbin, Jr., Philadelphia, Pa., for expenses as Resident Secretary	14.00
September	5,	To Johnson & Prince, Philadelphia, Pa., for typewriting and duplicating letters, by C. J. Marshall, Secretary	12.67

November 10,	To Title Guaranty & Surety Co., Philadelphia, Pa., for premium on Secretary's bond	$6.25
November 10,	To J. B. McKee & Co., Nashville, Tenn., for premium on Treasurer's bond	12.50
November 10,	To C. J. Marshall, Philadelphia, Pa., for salary and expenses	620.50
November 10,	To Williams Printing Co., Nashville, Tenn., for printing, by G. R. White, Treasurer	23.25
November 10,	To G. R. White, Nashville, Tenn., for expenses as Treasurer to September 1, 1912	4.50
November 10,	To Harry D. Gill, New York, N. Y., for typewriting, etc.	20.00
November 10,	To R. P. Marsteller, College Station, Texas, for expenses as Resident Secretary	7.55
November 10,	To W. H. Dalrymple, Baton Rouge, La., for cablegram to Liautard, Paris, France	3.72
November 10,	To Tait Butler, Memphis, Tenn., for expenses as member of College Investigation Committee	58.61
November 10,	To M. H. Reynolds, St. Paul, Minn., for expenses as member of College Investigation Committee	16.25
November 10,	To Francis S. Allen, Nashua, N. H., for expenses as Resident Secretary	3.00
November 10,	To F. T. Eisenman, Louisville, Ky., for expenses as Resident Secretary	1.00
November 10,	To Francis Abele, Jr., Quincy, Mass., for expenses as Resident Secretary	6.98
November 10,	To Geo. H. Glover, Fort Collins, Colo., for expenses as member of Committee on Intelligence and Education	3.60
November 10,	To Western Union Telegraph Co., Philadelphia, Pa., for telegrams, by C. J. Marshall, Secretary	3.86
November 10,	To Johnson & Prince, Philadelphia, Pa., for duplicating letters, by C. J. Marshall, Secretary	7.45
November 10,	To W. L. Williams, Ithaca, N. Y., for expenses as Librarian	42.54
November 10,	To W. W. Dimock, Ames., Iowa, for expenses as Resident Secretary	8.01
November 21,	To M. H. Reynolds, St. Paul, Minn., for expenses as member of International Tuberculosis Commission	4.80
December 13,	To M. H. Reynolds, St. Paul, Minn., for typewriting report of Committee on College Investigation	3.00
December 13,	To M. H. Reynolds, St. Paul, Minn., for telegram on account of International Tuberculosis Commission	1.00

December 13,	To Lafferty-Macey Co., Philadelphia, Pa., for Filing Cabinet and Supplies, by C. J. Marshall, Secretary	$27.65
December 13,	To A. W. Goldsmith, Philadelphia, Pa., for 300 pass cases, by C. J. Marshall, Secretary	82.50
December 13,	To Mrs. S. L. Coburn, Philadelphia, Pa., for labor and material in connection with card index system	77.78
December 13,	To F. A. Ingram, Hartford, Conn., for fees and dues returned	8.00
December 13,	To Henry W. Skerritt, Utica, N. Y., for fees and dues returned	8.00
December 20,	To Mrs. S. L. Coburn, Philadelphia, Pa., for services and material, by C. J. Marshall	140.67
December 20,	To C. J. Marshall, Philadelphia, Pa., for 3500 2-cent stamps	70.00
December 28,	To Geo. W. Dunphy, Rochester, Mich., for floral wreath for Mrs. S. Brenton	20.00
December 28,	To C. E. Stewart, Chariton, Iowa, for expenses in connection with assisting committee on College Investigation	7.73
December 28,	To Hal C. Simpson, Denison, Iowa, for expenses in connection with assisting committee on College Investigation	7.80
1913		
February 3,	To Charles F. Roberts, New Haven, Conn., for balance due for stenographic work	210.77
February 3,	To Mary Johnson, Baltimore, Md., for floral wreath for Dr. Wm. Dougherty	8.00
February 8,	To M. H. Reynolds, St. Paul, Minn., for expenses as member Committee on College Investigation	33.01
February 14,	To R. P. Lyman, East Lansing, Mich., for stamps for mailing Forty-ninth Annual Report	550.00
February 20,	To Elijah E. Patterson, Detroit, Mich., for fees and dues returned	8.00
March 12,	To F. G. Atwood, New Haven, Conn., for fees and dues returned	8.00
March 16,	To M. H. Reynolds, St. Paul, Minn., for typewriting report International Tuberculosis Commission	2.50
March 16,	To Stiffler-Robinson Printing Co., Fort Collins, Colo., for printing stationery, by I. E. Newsom, Resident Secretary	5.25
March 16,	To Will S. Peck, Watertown, S. Dak., for printing stationery, by S. W. Allen, Resident Secretary	6.50

March	28, To G. W. Dunphy, Rochester, Mich., for expenses in connection with Committee on College Investigation	$59.05
March	28, To Hull & Reeve, Washington, D. C., for services in connection with Army Legislation .	200.00
April	7, To R. P. Lyman, East Lansing, Mich., for expenses as Chairman Publication Committee and salary	341.67
April	14, To W. Horace Hoskins, Philadelphia, Pa., for expenses as Chairman Committee on Legislation	250.00
April	14, To N. S. Mayo, Blacksburg, Va., for expenses as Chairman Committee on Advertisements of Veterinary Remedies	7.15
April	14, To G. W. Dunphy, Rochester, Mich., for expenses in connection with College Investigation Committee	45.06
April	14, To M. H. Reynolds, St. Paul, Minn., for expenses in connection with College Investigation Committee	74.19
April	15, To Robert Smith Printing Co., Lansing, Mich., for publishing proceedings of Indianapolis, Ind., meeting	1938.28
April	16, To Johnson & Prince, Philadelphia, Pa., for duplicating letters and postage on same .	3.76
April	21, To M. H. Reynolds, St. Paul, Minn., for expenses in connection with Committee on College Investigation	59.60
April	21, To George W. Dunphy, Rochester, Mich., for expenses in connection with Committee on College Investigation	40.49
April	21, To A. Z. Nichols, Pittsford, Mich., for fees and dues returned	8.00
April	21, To Daniel P. Divine, East Falls Church, Va., for fees and dues returned	8.00
April	21, To Robert E. Ferneyhough, Warrenton, Va., for fees and dues returned	8.00
April	21, To Paul Quilty, Lake Charles, La., for fees and dues returned	8.00
April	21, John B. Gibson, Brooklyn, Mich., for fees and dues returned	8.00
April	21, To Mark A. Quilty, Lake Charles, La., for fees and dues returned	8.00
April	21, To F. A. Reichman, Geddas, S. Dak., for fees and dues returned (duplicate payment) .	8.00
May	7, To Otto Ashpach, Marion, Ohio, for fees and due returned	8.00
May	12, To Mrs. Clarissa B. Coburn, Philadelphia, Pa., for services rendered	49.62

May	19, To William M. Burson, Athens, Ga., for expenses incurred in assisting Committee on College Investigation	$19.16
May	26, To M. H. Reynolds, St. Paul, Minn., for stamps for use of International Tuberculosis Commission	5.00
May	26, To M. H. Reynolds, St. Paul, Minn., for expenses as member Committee on College Investigation	2.74
July	8, To N. S. Mayo, Blacksburg, Va., for expenses as member Committee on Advertisements of Veterinary Remedies	4.50
August	10, To W. Horace Hoskins, Philadelphia, Pa., for expenses on account of Committee on Legislation	50.00
	Total expenditures, 1912–13	$6189.44

Total receipts	$9351.67
Total expenditures	6189.44
Balance in Bank	$3162.23

FINANCE COMMITTEE, AMERICAN VETERINARY MEDICAL ASSOCIATION:

Gentlemen—This certifies that G. R. White, Treasurer, has $3162.23 on deposit at the State Trust Co. to the credit of the American Veterinary Medical Association.

JOHN C. ADAMSON, Cashier.

Nashville, Tenn., August 26, 1913.

PRESIDENT MOHLER: Gentlemen you have heard the report of the treasurer; what is your desire in the matter?

DR. BERNS: I move that the report be accepted and entered on the minutes.

(Motion seconded and carried.)

PRESIDENT MOHLER: The report of the Librarian, Dr. Burnett, will now be presented.

REPORT OF THE LIBRARIAN

S. H. BURNETT
Ithaca, N. Y.

As shown by the report of the Librarian a year ago, there were in the Librarian's hands at that time 915 copies of the *Proceedings*. During the year I have received 96 copies of the *Proceedings* for 1912 and have distributed 100 copies, leaving in my hands at present 911 copies. The number of copies of the *Proceedings* received, with the number distributed and now on hand, is shown in the following table:

	1897	1904	1905	1906	1907	1908	1909	1910	1911	1912
Received . .	1	15	18	91	13	160	152	194	271	96*
Distributed .	1	5	5	5	6	7	7	11	20	33
On hand Aug., 1913		10	13	86	7	153	145	183	251	63

Twelve books have been sold at $3 each. The copies distributed have been sent to members, to libraries, and institutions and some have been sold. The Librarian has sent copies postpaid in cases where it seemed not a member's fault that he did not receive his copy of the *Proceedings*. When a member has failed to receive his copy because he has moved and neglected to notify the Secretary of his change of address, I have sent his copy by express, collect. It seems as though members should be encouraged to keep the Secretary informed of their correct address. This year the Librarian's expenses have been more than covered by the money received from the sale of books. We could probably sell more copies if they were widely advertised. This plan was proposed this year. It seems to me, though, that the extra number sold would not much more than pay for the advertising if it did do so. The only profit there would be would go to the periodicals that carry the advertisement. The present method is, I believe, better policy for the Association.

It is possible to have a better method of disposing of our surplus copies of the *Proceedings*. Let me state what has been the method used and then propose another method.

The Association has no library. The Librarian is the custodian of the copies of the *Proceedings* that remain after the members have been supplied. Members of the Association failing to receive a copy of the *Proceedings* are supplied by the Librarian. On request, copies are sent to libraries and organizations needing them. A few copies are sold.

If we wish to have a library for the use of the Permanent Secretary, the following plan, I believe, is a good one. The office of Librarian should be abolished. The duties now performed by him should be given to the Permanent Secretary. He should ge given power to exchange and sell copies of the *Proceedings* and from the proceeds get such a library as he finds his office needs. We have not asked for books or pamphlets in return for *Proceedings* sent to institutions. It has been trouble enough for the Librarian to find room for storing our surplus *Proceedings.* I am confident that each institution supplied by us would be willing to give us its available publications in return. There are certain other publications, such as reports of societies, periodicals and the like, we could get by exchange. An exchange list could be given the chairman of the Publication Committee so the *Proceedings* could be sent at the same time they are to members, saving the trouble and expense of extra handling. A considerable number of volumes could be secured each year for a library, with no added expense. Such a library would be mainly for the use of the Secretary and other officers of the Association.

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* Received from Publication Committee 64 copies of *Proceedings* for 1912. Returned to me through mails 32 copies *Proceedings* for 1912.

If the Association desires a library for its members, a somewhat different plan would, I believe, be preferable. A much better library can be procured with, I believe, very little added expense. The extra copies of the *Proceedings* we have and the numbers to be added each year, together with exchanges we could have, as well as not, make a total that is well worth considering. I believe we could enter into a contract with some college or institution having a professional (veterinary, of course) library of its own to take our resources, extra *Proceedings* and exchanges and the money from the sale of *Proceedings,* and make a consulting library of them. The contract would need to be for a long time. If necessary, we could change our constitution so an institution could be the Librarian. The institution could have the privilege of using our books while it might grant us in return the privilege of using its books. In this way, both would benefit. Our books need not be duplicates of those the institution already has. So our addition would be of the greatest possible value to both the institution and to ourselves. It would not be difficult to formulate rules for the use of a library so there would be no danger of loss. The members of this Association have sufficient standing in their home communities to get their banks or a couple of real estate owners, without expense to them, to guarantee that they are good for the value of any book or books they may receive from the Association. The only expense there should be for a member is the price of the carriage of books both ways. Perhaps it might later be found desirable for the Association to pay the carriage one way. But that is merely a detail. The principal thing is whether the Association wishes to have a library. It is entirely feasible and does not necessitate any great expense.

Let me summarize:

1. The Association now has on hand 911 copies of the *Proceedings* from 1904 to 1912, and has been adding to this surplus at an average rate of over 100 copies a year. The number has varied from 64 to 291 during the last five years.

2. These surplus copies are, under the present usuage, of little use to the Association.

3. By exchange and sale, they could be changed into a library. There are two desirable plans to follow:

(*a*) If the library is for the use of the Secretary's office, the Secretary should also be Librarian, and be given power to acquire for the Association such books as he needs by exchange and sale of copies of the *Proceedings*. There should be an exchange list.

(*b*) If the library is to be for the use of the members of the Association, the Association should make a long-termed contract with some institution having a veterinary library to take the surplus copies of our *Proceedings* and make a consulting library of them. The Association should have printed each year as many extra copies of the *Proceedings* as the Librarian can use. The more books are sold or exchanged, the faster our library will grow. We should pay the Librarian's expenses for postage, stationery, and freight or express. The institution should furnish a librarian and a place for keeping our books. The greatest advantage will follow if the institution is allowed the use of our books and we are allowed to use those belonging to the institution.

DR. BURNETT: I have not spoken here of the desirability of the Association having a library of its own. Perhaps a word would be in order, as that is perhaps a matter for discussion. I think these two plans should be kept entirely separate. Not only that, but a Permanent Secretary would not be in a position to acquire a consulting library for the use of members of the Association. There is scarcely any member of the Association who is a trained librarian, and for this position it needs someone who knows what the available books are and how to get them. It requires a trained person, and it seems that now is the time to adopt one or the other of these two plans. We have been sending copies of our *Proceedings* to institutions and have asked nothing in return. I think any institution would give us all the books they have available without expense to us, but their copies are going out of print every year, and the longer we wait the fewer we will receive.

President Mohler: You have heard the Librarian's report; what is your pleasure with reference to it?

A Member: I move that it be received and referred to the Publication Committee.

(Motion seconded and carried.)

Dr. White: Mr. President, I move that the President be authorized to appoint a committee of three to answer the cablegram of Dr. Liautard, and express to him our sympathy and good wishes, and regrets at his not being able to be present with us on this occasion.

Dr. Ellis: I second the motion.

President Mohler: It is moved and seconded that a committee of three be appointed to send a reply by cablegram to Dr. Liautard expressing to him the sympathy and the felicitations of this Association. All in favor of this motion will give their consent by saying aye. All opposed no. It is carried. I will appoint Dr. Ellis as Chairman of the committee and Dr. Dalrymple and Dr. Gill as associates.

Dr. Higgins: Mr. President, I would like to make an announcement at this time if it is in order. This afternoon, at the section on Sanitary Science and Police, it was impossible to provide for the arrangements for Dr. White's paper on "The Eradication of the Cattle Tick and the Development of the Cattle Industry in the Southern States." This is a joint paper by J. A. Kiernan and George R. White, and it will come on tomorrow afternoon at 4 o'clock. It is a moving-picture demonstration, so those who wish to see the methods in use should be present.

President Mohler: I will now call for the report of the committee on diseases, Dr. V. A. Moore, of Cornell, Chairman.

REPORT OF COMMITTEE ON DISEASES

Veranus A. Moore, Chairman
A. T. Kinsley C. M. Haring
K. F. Meyer L. Van Es

Mr. President, Members of the Association:

At the meeting of the Association in Indianapolis certain subjects were assigned to the Committee on Diseases in addition to its regular duties. In order to comply with these demands and also to fulfil the requirements of the committee, the work has been divided among its members in such a way that the diseases referred to it have with one exception* been considered by individual members. The report of the committee, therefore, is composed of the following communications:

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* The exception is in reference to the control of hog cholera and the preparation of anti-hog cholera serum. This was undertaken by Dr. Van Es, who because of the burden of other and imperative work was unable to complete his paper for this meeting.

Report of the chairman, V. A. Moore.

"Forage Poisoning or Acute Encephalomyelitis of the Horse," A. T. Kinsley.

"Specific Para-tuberculous Enteritis," K. F. Meyer.

"The Use of Tuberculin in Testing Cattle and Hogs by the Intradermal and Other Methods," C. M. Haring.

The communications of the other members of the committee will be presented in the sections on Sanitary Science and Medicine.

Since the consideration of the diseases called for by resolution and others of special significance are to be discussed by individual members, it remains for the chairman to bring together matters of more special interest in the general study and control of animal diseases.

We have been fortunate during the past year in the absence of new or unexpected epizoötics. The most important malady that has occurred was the "horse disease" in Kansas and Nebraska that appeared more than a year ago. It has already been the subject of several papers, and at this meeting it will be further considered in a symposium in the section on Medicine. The success that has been attained in keeping out diseases not common in this country and the control of the more unusual maladies that have here and there appeared are attributable to the efficient quarantine enforced by the Federal Government, the work of the various live-stock sanitary boards and state and provincial organizations which are entrusted with the sanitary protection of our domesticated animals. However, it is recognized that diseases such as glanders, hog cholera, infectious abortion, tuberculosis and rabies which gained access to our flocks and herds in former times are still with us. The reports from different states show that these diseases are still costing our live-stock owners millions of dollars annually and that they are not being checked so rapidly as many people believe they should be. Nevertheless, much additional knowledge of each of these diseases has been acquired, and in some instances better methods for their control have been introduced. Yet in spite of this good work, the natural laws that govern the spread of many serious diseases of domesticated animals are still operating more or less successfully without recognition or human intervention. While this may seem strange, it is in harmony with human progress everywhere. It is as true in pathology as in philosophy that many lines of reasoning and research lead, as it were, into blind alleys from which there is no further progress. These investigations are valuable but they necessitate a retreat and a new start. This is why real advance often follows a line of inquiry that is contrary to the accustomed habit of thought or methods of action.

It is impossible to comprehend the symptom-complex of a disease until a knowledge of its life history is complete. It requires much time to ascertain these facts. The answer to those who feel that progress in veterinary sanitation is too slow and that the blighting effect of infectious diseases is unnecessarily severe is to be found in a desire to attain beneficial results by some short cut like the "wave of the mystic wand." This desire on the part of many is the direct outgrowth of much of our modern teaching. We have now, as in the past, those who seek for results without submitting the principles involved to thorough study and application. The science of medicine has always been the victim of those who recommend a remedy because it seemed to be easy and quick rather than from a knowledge of its efficiency.

It seems fitting that we should address ourselves briefly to some of the basic principles in the nature of infectious diseases and their application in diagnosis, treatment and eradication. The greatest problem before the sanitarian is to eliminate the diseases already of long standing and wide distribution. The discovery of the specific nature of the epizoötic diseases pointed the way for their control, which consists in an accurate diagnosis and the prevention of the spread of the virus from infected individuals and otherwise. Diagnosis, therefore, is the first and most important act in any system of control. A careful analysis of the failures to prevent the introduction of diseases such as glanders and tuberculosis into uninfected herds will show that the most common cause was error in diagnosis due to the failure of the method employed or ability to use and interpret the same. This suggests that the practitioner and live-stock sanitarian should be most efficient in diagnosis. It is so important that I wish to dwell upon it briefly.

The diagnosis of an infectious disease may be made in four ways: namely, (1) by the symptoms, (2) from the lesions produced, (3) by finding the specific cause and (4) from certain specific reactions. The specific diseases that can be accurately detected from the symptoms alone are few. Those that can be ascertained from the gross examination of the lesions are also limited. Those that reveal themselves through their etiological factor are more common, provided the lesions are examined at the proper stage of development. These three methods of diagnosis imply simply a competent knowledge of general and special pathology and microbiology and should not require further discussion here. The diagnosis by means of specific reactions, however, involves not only a knowledge of microbiology but also of sera reactions and immunity. These are relatively new topics and the rapidity with which they have appeared speak for the complications that exist and the limitations that must be reckoned with. The introduction of vaccine therapy and immunizing agents have further complicated the efficiency of these tests. These obstacles in the way of accurate diagnosis are among the most serious problems with which the veterinarian has to deal. I will illustrate this difficulty by the newer methods for the detection of glanders.

During recent years the superiority of the agglutination test and the complement fixation method over mallein in the diagnosis of glanders has been emphasized. Either of the sera tests is thought to be specific and when carefully used, without the complication of mallein, will give fairly accurate results. When, however, these tests follow the use of mallein, the results are questionable, owing to the effect of the injected mallein upon the reaction. The effort to immunize horses against glanders or to treat them for that disease by the use of the glanders vaccine complicates further the results of the sera tests and also interferes with the use of mallein. How then is one to interpret the findings of any of these specific tests, where mallein and vaccines are used indiscriminately by owners, health officials or veterinarians? The chairman of your committee hopes that the committee on glanders will recommend some procedure for diagnosis and control that will eliminate the complications in diagnosis now confronting the administrative officers who must depend upon your findings for official action. It is possible to have just and equitable laws for the disposition of infected horses, but the diagnosis, especially of occult cases, must be based on sound and uncomplicated principles.

I have already called attention to occasional failures in control of disease because of the limitations of specific methods for diagnosis. Public sentiment has often been so eager for quick and positive results that professional men have tended to be hasty in drawing conclusions relative to the value possessed by various specific diagnostic agents. The best and full benefits from any agent or method cannot be realized until it is fully known and properly tested. The best illustration of this is tuberculin. The analysis of the failures in its use shows that it is not the fault of tuberculin itself but rather a lack of knowledge of it. Had Koch been permitted to have completed his studies of this substance before it was given to the public, it would undoubtedly have been saved many harsh criticisms. In like manner the unfortunate veterinarian in whose hands it has found its limitations would not be accused of dishonesty. It was reserved for members of this Association to point out that the customary subcutaneous injection of tuberculin will in a certain percentage of cases fail to give a reaction until the second or third day after the injection. Dr. Haring will give in his report the data that justify the conclusion that the intradermal use of tuberculin will in certain instances give a reaction where the subcutaneous method failed and the post-mortems showed old and encapsulated lesions. It is also possible that those cases which do not give a temperature reaction from the subcutaneous injections until from one to three days afterward indicate arrested lesions. The verification of the discovery of these properties of tuberculin will be of much value to those who are trying to eradicate tuberculosis from infected herds. Tuberculin was brought into general use for diagnosis before the nature of tuberculosis was well understood, and in this country the eradication of that disease from cattle has been based almost entirely on its use, with the result that individual cattle owners and veterinarians have been accused of chicanery when they had done their work conscientiously and up to the limit of the knowledge possessed. The time has come when this spirit of accusation against well-meaning men should change. Dishonesty should be punished, but I deplore the smirching of character because of ignorance on the part of those who judge. The eradication of tuberculosis still presents many difficult problems, but the outlook is brighter than ever before. This is due to more knowledge of the disease itself and the methods for its diagnosis as well as the recognition of the importance of the disease in its entirety. We have laws aimed at its suppression which actually retard its elimination and encourage its spread because they recognize but part of the problem. These must be amended. Your chairman recommends that this Association urge the enactment of sane and uniform laws in connection with this disease, using the report of its Tuberculosis Commission as a basis.

Another disease that seems to largely defy the efforts of the veterinarian is contagious abortion in cattle. The investigations already reported indicate almost unanimously that the organism discovered by Professor Bang is the cause of this trouble. There are, however, two important problems yet to be solved before very specific precautionary measures can be formulated. These are (1) the normal habitat and distribution of the specific organism, and (2) the usual channel of infection. The investigations now under way for the purpose of ascertaining exact data on these points are expected to give information that will enable veterinarians to render more efficient service in dealing with this disorder. It should be stated that considerable evidence is available that infection usually takes place through the digestive tract. The desirability of isolating cows that are about to abort is obvious. It is equally important that after aborting these animals should be kept away from heifers that have not been bred or that are in the period of gestation. Examination into the length of time that animals eliminate the virus after they have aborted shows that as yet this point has not been settled. We have found that it exceeds six weeks in some cases. The advisability of undertaking, as a general routine, the detection of infected cattle by means of one or more of the sera tests is somewhat questionable at the present stage of our ability to interpret the reactions. It is desirable that carefully conducted experiments in testing and isolating the reacting cattle should be made, for until sufficient data are accumulated the value of the method must remain in doubt. In formulating methods of routine, it should not be forgotten that already the burden of disease is a heavy tax on the animal industry of the country and it does not seem wise to recommend generally methods of themselves expensive until we are able to interpret the findings and to use them advantageously in control. It is neither necessary nor wise to be too hasty in these matters.

It is to be regretted that Dr. Van Es was unable to present his paper on "The Control of Hog Cholera and the Use of Serum." The statistics from the hog-raising states tell of the fearful losses cholera occasions. The report from many other states point to the continuous spread of this disease to heretofore uninfected localities. This calls for constant vigilance on the part of the veterinarian. The accurate diagnosis of hog cholera and a thorough knowledge of the use and theories of anti-hog-cholera serum are absolutely essential. There is, however, still much difference of opinion regarding the best method for making the serum. There are still strong differences of opinion regarding the serum alone and the serum and virus methods of immunizing hogs. These are differences that cannot be adjusted on theoretical grounds alone but they require in addition much exact data. These will undoubtedly be forthcoming with the results of the investigators already engaged in this work. It is impossible at this time to suggest any method or procedure other than those in operation. It is, however, important that while the highly technical questions are being accurately answered, every possible precaution should be taken to prevent the spread of the disease. Cholera-infected premises should not be visited by those having healthy hogs. Strict quarantine should be observed. The prevalence of this disease among garbage-fed hogs indicates that drastic measures should be taken to enforce the cooking of all garbage that is fed to pigs. This applies not only to those who collect refuse for this purpose but also to individuals who keep but a few animals. The fact that much pork is used which comes from a distance and which may have come from hogs in the early stages of the disease renders pork trimmings somewhat suspicious. Whether they are a source of infection is still presumptive, but their sterilization is a safe precaution until the research work on this subject now in progress gives sufficient data upon which to base definite recommendations. There is no other disease of animals where the veterinarian has a more difficult or responsible task than in checking the spread of hog cholera.

I have already called attention to the enthusiast in medicine who in his eagerness to accomplish results tries to hasten nature's method by taking short cuts to the goal. This method has usually been disastrous and not infrequently it has brought discredit upon efficient procedures. The introduction of microbiology and the theories of immunity have given occasion for the most extensive practises of this kind known to the history of medicine. I refer to vaccines and vaccine therapy. In the beginning vaccination was employed as an immunizing agent before infection had taken place and it was used to protect individuals against disease. Pasteur introduced a new feature in the immunizing process with his antirabic vaccine which could be used immediately after infection. It brought about immunity ahead of the more slowly developing disease caused by the virus. Following this, Wright and Douglass advanced the process of immunity by injecting quantities of dead bacteria from cultures made from the patient suffering with chronic infections. They explained that this rapidly acquired immunity was accomplished through the agency of the reactionary substances, or opsonins, thrown off by the tissues and which accelerated phagocytosis. It is based on the very specific action of the opsonins. They prescribed a method for measuring the dose of the dead bacteria, based on the degree of ingestion of the organisms by the phagocytes. It was a carefully worked-out process based on definite findings in each individual case on which it was used and it gave promise of much good. From this fundamental discovery the medical professions, both human and veterinary, plunged into vaccine therapy for many kinds of both acute and chronic infections. More than this, the so-called phylacogens came bounding to the front. The scientific methods for using dead bacteria and their adaptation to the host were cast to the four winds and indiscriminate preparations of dead bacteria, either of a single species or of many species, regardless of their source or adaptation to the case in question, were pushed upon the market. The occasional success of this method can be rationally explained, for by the laws of chance the vaccines used, accidentally here and there, act in harmony with the governing forces, as one ignorant of music may now and then sound a few harmonious tones. The commercialism accompanying the method of wholesale vaccination, separated from its scientific requirements, and the abandonment of a knowledge of the etiology or diagnosis of the case in hand, is one of the most pitiable spectacles ever exhibited in the practice of medicine.

I wish to be perfectly clear on this subject. I believe there is much benefit to be derived from vaccine therapy when the vaccines are made from the right cultures and properly used. There is a no more delicate response to medicine than the reaction of living animal tissues to bacterial proteins; but the desired result cannot be expected unless there is accuracy in securing the culture, care in the size of the dose, and the number and frequency of the doses necessary carefully determined. Vaccine therapy, which is simply an offshoot from prophylactic vaccination, represents the acme of scientific medicine. When used properly it has proved, in certain cases, to be of great benefit—in fact, specific in its effects; but when it is employed without regard to the biological relation existing between the infecting organism and the tissues it cannot be considered other than quackery. It is to be hoped that indiscriminate vaccine therapy will soon be abandoned and in its place there will appear efficient methods for successfully applying the principles of immunity in therapeutics. Its possibilities are so great that I am constrained to recommend that this Association appoint a committee to investigate and to report on the subject of vaccine therapy in veterinary medicine.

In the control of infectious diseases there is need for verification of diagnosis by careful post-mortem, histological and bacteriological examinations. The course of each disease is quite definite and often a diagnosis can be made without special inquiry. Frequently, however, the differentiation is not clear and further study of the lesions is necessary. The efficiency of the diagnostic test employed is often on trial and further information concerning the distribution of lesions is always important. Some years ago it was reported to this Association that intestinal tuberculosis in cattle was very common in a certain state. A little later I was privileged to witness the post-mortem of five cows in that state, slaughtered after the tuberculin reaction, in which the intestinal nodules due to œsophagostoma were recorded as tubercles. Serial sections of nodules from each of these animals revealed the presence of the worm, and tubercle bacteria could not be detected. This simple examination corrected a serious pathological error. Some years since the efficiency of tuberculin was called in question by a prominent party when a cow that had failed to react in an official test was killed and reported to be badly affected with tuberculosis of the lungs. Tuberculin was condemned and the official method of control was bitterly attacked. An examination of the lesions showed them to be those of actinomycosis. The diagnosis was easily made with a hand lens. Perhaps the most common error in diagnosis of this kind that is being made at present is in confusing nodules of a parasitic origin with glanders. Here the differentiation can usually be made by means of the excess of eosinophiles in the parasitic lesions. In hog cholera the positive diagnosis is impossible without post-mortems or blood inoculation. Again the slaughter of animals for diagnosis has led to grievous error because they were killed before the lesions were sufficiently developed to be detected. It seems unnecessary to go farther into the proximate principles of pathology as applied to control, but if all errors were eliminated that could be avoided by the faithful observance of these principles the standing of our profession would be better and our efficiency to both client and state would be greatly enhanced.

The valuable work that has been done in the study and control of animal diseases during the last year speaks for a distinct advance in veterinary service. The success can be traced to the more rigid application of scientific principles and methods in every-day practice. This points to a higher professional efficiency which promises much for the health, which is the wealth, of the live-stock industry of our countries and assures for the veterinarians of the next half-century an enviable position in scientific and professional circles.

President Mohler: Gentlemen, the report of the Committee on Diseases is now before you for action.

Dr. Lyman: Mr. President, it seems from the reading of the report that there are two recommendations, and I would move that the report be received and be referred to the Committee on Resolutions.

Motion seconded.

President Mohler: It has been moved and seconded that the report be received and be referred to the Committee on Resolutions. All in favor of this motion will please say aye. Those opposed no. The motion is carried.

Inasmuch as the Executive Committee has no report to make at present, there will be no admission of new members at this evening's session. Is there anything further, Mr. Secretary? If not, a motion for adjournment will be in order.

Dr. Kinsley: I move we adjourn.

(Motion seconded and carried.)

GENERAL SESSION

Tuesday Morning, September 2, 1913

President Mohler: Gentlemen, please come to order.

We are very fortunate in having with us this morning a gentleman who needs no introduction to an audience of veterinarians. As a Director of the Laboratory of the Pennsylvania Live-stock Sanitary Board, the collaborator of Leonard Pearson, a former president of the U. S. Livestock Sanitary Association, an honorary member of this Association, and at present the Director of the Hygienic Laboratory of the University of Wisconsin, he has done brilliant work in extending the field of veterinary science along many lines. I therefore take great pleasure in presenting to you Dr. Mazyck P. Ravenel, of the University of Wisconsin, who will address us on "Some Aspects of the Tuberculosis Problem."

SOME ASPECTS OF THE TUBERCULOSIS PROBLEM

Mazyck P. Ravenel, M.D.
University of Wisconsin, Madison

Mr. President and Gentlemen of the American Veterinary Medical Association:

I cannot start, I would do violence to my own feeling, unless I should first express my gratification at being here with you; first, for the exceedingly delightful and courteous invitation sent by your President and Secretary to attend this your fiftieth anniversary, and, second, for the pleasure at my being able to accept this delightful invitation. As I wrote Dr. Marshall, my election to honorary membership in this Association I have regarded always as one of the most delightful and pleasant honors that has ever come to me. I do not like to give it away, but as I look around I see before me a good many of my old students whom I used to teach at the University of Pennsylvania, some of whom are more bald-headed than I am, but still it makes me feel a little bit old. My associations from the time of my graduation have been with veterinarians, largely, and, as Dr. Mohler pointed out, I had the rare good fortune—from every standpoint, personal as well as scientific—to be associated very closely with Dr. Leonard Pearson for about twelve years. Therefore it was a delightful invitation and a delightful compliment to be asked to come and talk to you.

Now, when I am requested to talk before any body of any sort, except suffragettes, I feel that there are two things that they want of me: one is to talk about tuberculosis, and the other is to speak about hydrophobia. Those are about the only two things that I know anything at all about. This time it is tuberculosis, and although this subject has been talked upon so much and is in the mouth of everybody we cannot learn too much about it. Tuberculosis remains today in the veterinary profession the one great problem of the profession in the prevention of disease; it remains in human medicine the one great problem of today; from the sociological standpoint it remains the one great question for the sociologists, or the greatest single question; and from an economical standpoint in our food industry it is the one great problem that we have confronting us. Therefore, I feel that no apology is needed for speaking on this subject.

The aspect of tuberculosis to which I have given the greatest attention and the most years of study, many of them in conjunction with Dr. Leonard Pearson, has been tuberculosis as a danger to the public health. I shall review the history of this movement very briefly.

You remember that when Koch discovered the tubercle bacillus that he studied animal tuberculosis. I have to go back farther than that, even going back to Villemin. In 1865, Villemin, although the germ was not discovered at that time, demonstrated that tuberculosis of animals and tuberculosis of mankind—tuberculosis of the bones, joints, lung, liver, kidney, regardless of the locality or of the animal affected—is one and the same disease. Then when Koch discovered the germ in 1882, he again gave very much the same demonstration, and in speaking on those subjects he said that it might seem that there were differences in virulence of these germs, and differences in their action, but he had tried over and over again and had been unable to detect any such differences. It remained for Dr. Theobald Smith, well known to all of us, to point out certain differences between the human tubercle bacillus and the bovine tubercle bacillus. Then in 1901, on what I have always believed to be insufficient evidence, an insufficient number of experiments, and perhaps other things coming in to mislead him, Koch came out with the startling announcement at the London Congress, that bovine tuberculosis was different from human tuberculosis and that human tuberculosis was not transmissible to animals, a blunder so collossal that we cannot understand how a man of Koch's genius could have made it when the experiment was so easily tried to demonstrate the opposite. And conversely, he said that if the bovine disease was transmissible to the human being its occurrence was not greater than that of hereditary tuberculosis and we need not take any measures to provide against bovine tuberculosis on account of the danger to the public health. Well, of course, everybody in this room remembers the terrible stir which Koch's announcement made. The veterinarians all over the world had been taught that the diseases were entirely transmissible; our state boards of health had acted on that belief; our legislatures had made laws accordingly; and all over the world people were going on the assumption that bovine tuberculosis must be guarded against, not only as an economic scourge, which all of us recognized so well, not only on account of the cattle industry, but also on account of its menace to human health. About that time—and I think I see before me some who were present there in London—the British Government appointed a Royal Commission and the German Government appointed an Imperial Commission to work upon this problem. However, before either of these commissions had been appointed, experiments at the State Live-stock Sanitary Board of Pennsylvania had been going on in coöperation with Dr. Leonard Pearson on exactly these same lines, a study of the comparative virulence of the germ as derived from human beings on the one side and from cattle on the other, and the question of their entire transmissibility—could the disease pass from animals to man, or from man to animals. Since 1901, work has been done in every part of the world, and at the present day I believe there is no difference of opinion on these chief points, namely: that the germ is one and the same in origin, that the chief difference is in virulence and that the disease in cattle can be transmitted to mankind. There remains now only two principal questions for discussion. One of these is, To what extent is human tuberculosis derived from the cattle disease? And the second is, Are we capable of recognizing in the human being the origin of the germ when we find it there? In other words, does the bovine germ, when it becomes implanted in the human being and produces tuberculosis—or consumption, as the ordinary form is called—undergo modifications in morphology, cultural characteristics and virulence, so that we fail to recognize it?

Now, this point I may explain: after the Congress in 1901, and the publication of the reports of these various Commissions spoken of, Prof. Koch visited us in Washington in 1908, at the International Tuberculosis Congress, and there shifted his ground absolutely, and I must say that very few men apparently recognized this shift. He said that he had been studying the question further, and had arrived at conclusions which were practically identical with those enunciated in 1901. But what was the 1908 enunciation? Why, it was almost in these words: that bovine tuberculosis does not produce pulmonary consumption in the human being. In other words, as far as his paper went, he absolutely ignored the question of intestinal tuberculosis or meningeal tuberculosis, or the various types of tuberculosis that are chiefly due to the bovine type of organism, but his remarks were directed entirely toward tuberculosis of the lung. He said it did not produce tuberculosis of the lung, or what we ordinarily call pulmonary consumption. Well, of course, very few people were in a position at that time to answer Koch on that line, because the struggle up to that time had been to demonstrate whether or not the germ was transmissible, most of us holding that if the bovine bacillus could produce a fatal disease in the human being, that was sufficient to cause it to be guarded against. A remark that I sometimes use in talking to a lay audience, and which will not go badly here, is quite in point: If you get on the New York Central Railroad track, or get on the Pennsylvania Railroad track, and have an engine of the same weight approaching you, at the same speed, and hitting you in the same place, it is going to have very much the same effect. I think it makes very little difference to human beings whether they die of intestinal tuberculosis or of pulmonary consumption. I recognize fully the old saying, "De mortius nil nisi bonum," and I do not want to criticise a man who is not here to defend himself. While I recognize this fully, I cannot feel that Prof. Koch did justice to the community and to the scientific world in ignoring that problem and trying to defend his first mistake by saying that the bovine bacillus did not produce pulmonary consumption, which nobody claimed, so far as I know.

However, what are the results since then? The English Commission has found the bovine germ in pulmonary consumption, not in many cases it is true, but enough to show that it does occur there. I might cite the culture which many of you know as Culture M, that was derived from a niece of a former professor at the University of Pennsylvania. We always used it and regarded it as a human culture, and it is the culture which was used so extensively by Dr. Pearson and Dr. Gilliland in their work on tuberculosis. I judge that it has been used in upward of 5000 animals and has never shown anything but human characteristics although it reacts to the glycerin test of Smith like a bovine bacillus; so that there is a culture which has produced fatal disease in the human being, and has lost all of its bovine characteristics except perhaps an alkaline tuberculin in glycerin broth. Therefore, it may be said that we have at least one culture which has undergone change in morphology and virulence so that it cannot be recognized by any of the ordinary tests except as a human culture. Further work has been done by Dr. Eber, of Leipsic, and also by Dr. Pearson and myself in changing a human culture back into a bovine type. Now, if there is one principle in bacteriology which I think is sound, it is that it is easier to degenerate a culture, so to speak, than it is to bring it up. In other words, many of our cultures will go from a highly parasitic type, a highly virulent type, to a non-parasitic type and a non-virulent type simply by keeping them in the laboratory. So that when you come from the lower up to the higher, I think you are doing a more demonstrative piece of work than you are in going from the higher down to the lower, because it seems to be the nature of germs in animals as well as human beings to descend very rapidly and easily, or from slight provocation. So that some of us hold—and I do not pretend to say that this is decisive; I would not give you the impression that I even believe it myself to the extent of having been positively proved—that after residence in the human body, and producing pulmonary consumption, the bovine germ can undergo such changes in its characteristics, in morphology, cultural characteristics, and chiefly in its virulence, that it is no longer recognizable as a bovine bacillus. This is held by men like Eber, of Leipsic, by some of us in this country, and by the English Royal Commission. But many men like Theobald Smith do not think this is possible; they still hold that we can recognize the germs as we find them. I am ready to admit that of all germs which I have ever studied the tuberculosis bacillus retains its characteristics more strongly than any other. Yet I cannot doubt that it undergoes changes. I know, for instance, Dr. Trudeau, at Saranac Lake, has a culture, originally isolated by Koch, one of his own, which will not produce tuberculosis in guinea-pigs at the present time except in enormous doses. And we have the characteristic changes, demonstrated by Nocard of the mammalian tuberculosis bacillus being converted into the avian, which shows very much greater differences than exist between the bovine and the human types. We have also the other typical examples of the blindworm bacillus, produced by Moeller from the mammalian tubercle bacillus by inoculating the blindworm or the slowworm; and the cultures of fish bacilli of Dubard and Aujesky which have been changed into cold-blooded bacilli —in other words, bacilli not requiring the body temperature for growth—from tubercle bacilli which differed in no essential from the mammalian type. Last but not least, I will simply mention in passing the tubercle bacillus which upset so many people in the country last year, Dr. Friedmann's turtle bacillus, which was also probably a cold-blooded bacillus, perhaps derived from one of the warm-blooded animals, if indeed it was a tubercle bacillus at all. Therefore, it seems to me that we cannot doubt that these changes take place in morphology, but this is an academic question; it is a question which has an academic value very much more than a practical one.

I would like to see it settled simply because many people who continue to belittle the danger of bovine tuberculosis to mankind bring those questions up to demonstrate that it does not produce pulmonary consumption.

Now, my rule in life has always been never to claim any more on a scientific subject than you can demonstrate and can prove. I would like to see that settled. My belief is that these changes can take place and probably do take place quite frequently; but we have no proof of the change, and therefore I do not intend to claim it as a proved fact.

But what of the other standpoint? What about the great practical features of the case that we can judge by clinical work? We have some very striking instances, and here again I must make a little boast for American men, because they first gave the absolute proof of the danger to human beings of the bovine tubercle bacillus. It was done at the State Live-stock Board of Pennsylvania, and the cultures were obtained from the Children's Hospital in Philadelphia, at the very time that even in New York here the leading men were saying that there was no danger to children at all. Following, however, the Congress in Washington, in 1908, Dr. Park, the Director of the Laboratories of the Board of Health, started to work on this subject, and he has demonstrated that in the city of New York upward of three hundred children die every single year from bovine infection; three hundred fatal cases occur each year in the single city of New York.

We all know that there are many cases of tuberculosis which are not fatal, which produce only more or less permanent and more or less severe deformities in the skeleton—hip-joint disease, psoas abscesses, enlarged glands of the neck and so forth. And when you come to take account of the non-fatal cases, it seems pretty evident that 30 per cent. of the cases of tuberculosis of children—I think those are Dr. Park's figures, although I may be slightly mistaken—are due to bovine infection. Certainly we have then good reasons to believe in the danger of bovine tuberculosis to human health.

Now, Dr. Park has collected some very interesting figures that I am going to run over briefly.

In grouping his cases he found that at the Babies Hospital out of sixty-three children dying of tuberculosis, fifty-nine proved to be human infection and four bovine—a percentage of $6\frac{1}{3}$ bovine.

In taking the Foundlings Hospital, with a smaller number of children, it is true, out of nine cases five died of bovine infection and four of human; that is a percentage of 55 bovine.

Now, what is the great difference between these hospitals? In the Babies' Hospital the infants are nursed or fed on what is called prescription milk; that is, pasteurized milk, but largely wet nursing, or fed on woman's milk—because I suppose most of you know that at the present time there is quite a dairy industry carried on in woman's milk. They sell it by the quart and by the pint, and feed babies on it. Now, at the Foundlings Hospital, on the other hand, they are given nothing but cow's milk. Therefore it seems to me perfectly justifiable to claim that the figures at the Foundlings Hospital demonstrate as accurately as such small figures can, the actual danger of unprotected cow's milk, namely, 55 per cent. of deaths. It is true, I acknowledge, that those figures are too small on which to base sweeping conclusions. Nevertheless, there is the demonstration of the danger of unprotected cow's milk at the Foundlings Hospital. Taking figures from all sources, in the city of New York, Dr. Park comes to the conclusion that the total death rate in children in New York City averages about $12\frac{1}{2}$ per cent. due to bovine infection. Remember, those are fatal cases; it does not take into consideration the cases of deformity, hip-joint disease, and those things of which I spoke. So that, calculating it even at 10 per cent., it means that at least 300 children die in this city every year from bovine infection. Surely we need no better evidence than that to demand of us the protection of the human being against bovine tuberculosis. Dr. Park has also collected figures from all parts of the world, and they are very interesting.

In adults, 787 cases have been examined, of which 777 show human infection and 10 show the bovine infection. The conclusion is that, so far as we can judge, adults are probably fairly immune to bovine infection. So far as our evidence goes, we must admit that.

Coming to children from five years of age to sixteen years of age, we have 153 cases, 117 of which were human and 36 bovine. Coming to children five years old and under—from birth until five years of age—we have 280 cases, 215 of which were human and 65 bovine, coming very closely, it has struck me so often to the figures taken from clinical work in England, from which we get the best information on this subject, namely, that from about 23 to 25 per cent. of the fatal cases of tuberculosis in children are due to bovine infection. Please remember once more that I do not pretend to give you these figures with the assurance that they are absolutely accurate, but the indications are that of those children who died of tuberculosis, taking several countries together, the percentage of deaths from bovine infection is not far from 25 per cent.

We have one other very interesting series of figures which would make, if the newspapers got hold of it and knew how to write it up, one of the most touching stories that I have ever heard. This story I believe has never been published. It was told to me personally by Dr. Stiles, the noted surgeon of Edinburgh, and the figures coming from that work have recently been published. Dr. Stiles is a specialist in joint and bone troubles, and has been watching for a long time tuberculous bones and joints in children. Dr. Stiles, for years, has been convinced of the danger to human health from bovine tuberculosis. The English people have been stronger on this point than any other except perhaps the American. Dr. Stiles came to the conclusion, from clinical evidence, that most of these cases of bone and joint tuberculosis were bovine in origin. Being called into a consultation once, in the case of a child living in the vicinity of Edinburgh, he made a diagnosis of bovine tuberculosis; the child was too far gone to be helped, and died within a very few days, and Dr. Stiles told the father that the child had died from bovine infection. The father said that this was impossible, because he kept his own cow, and she had been tuberculin tested. Dr. Stiles' reply was that probably the testing was badly done or else the cow was so far advanced in the disease that she had not given an accurate reaction. The father allowed the cow to be killed, and upon examination she was found to be simply riddled with tuberculosis—a far advanced case. The father was so much impressed with this condition, he said he had suffered so much by it, that he then gave a fund of money for an investigation, and some of the results of that investigation were published a short time ago, which I will read to you:

"Seventy cases were examined, these being children most of whom have not died. Forty-one of these showed the bovine bacillus, and 26 human; 3 showed both bovine and human. Sixty-seven of these cases were children twelve years of age and under, and 3 cases were of adults twenty-four, twenty-five and thirty years of age respectively."

Taking the children from birth to the five-year period, for a comparison with the results given by Park and Krumwiede, we find in 47 cases 32 infected with the bovine germ and 15 with the human, a percentage of 68.

When we come to study the family history of these cases we find some very impressive facts. In 21 cases there was a family history of tuberculosis. Among those which gave a family history of tuberculosis, 15 gave human cultures and 6 bovine. That is, 71 per cent. showed human tuberculosis in those 21 cases, but in families where there had been no tuberculous history, of the 52 cases 9 proved to be human and 43 bovine; in other words, 83 per cent. of those cases were due to bovine infection. You see, the picture there is entirely reversed.

Now I want to read a few statistics just to show you how bovine tuberculosis affects particularly the children of young age. From birth until one year of age 4 cases were examined, all 4 of them bovine; none of them human. One to two years, 12 cases; 8 bovine, 2 human, and 2 showed both human and bovine infection. From two to three years of age, 15 cases; 11 bovine, 3 human and 1 both infections. From three to four years of age, 10 cases; 6 bovine and 4 human. From the four to five year period, 6 cases; 3 of each. Then as we go on up to eleven and twelve years the percentage of human infection gradually increases, and the percentage of bovine cases decreases. In giving these figures for the period from birth to five years of age, I took the 47 cases that I quoted before, 32 being bovine and 15 human.

In the face of these figures it seems to me that nobody can, and as I said before I believe that nobody does, deny the great danger to human health from bovine tuberculosis. So that, leaving out of consideration the great economic problem, the great problem that you gentlemen have as practitioners of veterinary medicine, and the great problem, that presents itself to the state veterinarians, our Bureau of Animal Industry, etc., is to safeguard human health against this awful disease. I have long felt that the veterinary profession and the medical profession should get together on this problem and should come closer to each other than they have ever been. In our national association for the study and prevention of tuberculosis we put in Dr. Leonard Pearson as one of our first directors, and last year we asked you, gentlemen, to take part in the program and invited you to meet with us. It is a world-wide problem that is not going to be solved by any one division of the medical profession; we must take in every single bit of help that we can get from every source whatever. We medical men must work together, but in addition to that we must interest our sociologists, we must get our politicians, and get them interested also. Otherwise, this great scourge and curse of our time will continue. It is a black spot on the reputation of our civilization at the present time to permit this preventable disease to continue to reap its harvest of over a million deaths every single year. In the United States alone over 200,000 of our fellow-citizens every year go down to their graves from a preventable disease.

Therefore, let me repeat, leaving out of consideration the economic problem, we should get together and utilize every agency, taking in every little bit of help we can get from every source, and wipe out this scourge of today and this blot on our civilization.

I thank you very much, gentlemen, for listening so attentively; and once more I want to express my great pleasure and pride in being here with you at your fiftieth anniversary.

President Mohler: Gentlemen, I am sure we all feel extremely grateful to Dr. Ravenel for his very interesting address, and the Chair will now entertain a motion for a vote of thanks to Dr. Ravenel for his kindness in being present with us this morning.

Dr. Woodward: I make a motion that a vote of thanks be tendered Dr. Ravenel for his very interesting address. (Motion seconded.)

PRESIDENT MOHLER: Motion is made and seconded that we tender Dr. Ravenel a vote of thanks for his very instructive address. All in favor of this motion will please rise. Opposed? Dr. Ravenel, I take great pleasure in extending to you a vote of thanks from the Association for your interesting and instructive address.

DR. RAVENEL: I wish to thank the Association for this vote, but I think the thanks are entirely due from me to you.

PRESIDENT MOHLER: The first order of business on the program this morning is the report of the Committee on Intelligence and Education. I will call on Dr. E. A. A. Grange, as chairman, to furnish the report.

REPORT OF THE COMMITTEE ON INTELLIGENCE AND EDUCATION

E. A. A. GRANGE, Chairman
PIERRE A. FISH W. B. CRAIG
C. H. STANGE A. R. ARCHIBALD

Mr. President and Gentlemen:

It is with feelings of much satisfaction and pleasure that I open this report with encouraging statements regarding the prospects of the veterinary profession in the United States as well as Canada, and this encouragement comes through the great increase in numbers of our all-important clients, the faithful horse, and here let me quote some government statistics covering a period of four years.

Horses in Canada in 1908, 2,118,165; in 1912, 2,336,800; increase, 218,635.

In United States: 1908, 21,181,350; in 1912, 23,336,800. Increase, 2,186,350, allowing a proportion of 10:1 in population in favor of the U. S.

But encouragement comes not only from the increase in the numbers of our clients, the lower animals, but the ramifications of veterinary science and the teachings of various veterinary colleges on this continent are attracting the attention of other institutions of learning, and a field for the training of some branches of veterinary science in public schools and the like, is now opening up. Possibly this may be better understood by giving you a single example, to wit: Recently a principal of a high school in a neighboring locality applied to the executive officer of a veterinary college for a graduate who could teach veterinary anatomy, some bacteriology and other subjects to be determined later, but all having relation to the lower animals. Further, the executive officer of one veterinary college reports that he is unable to supply the demand for graduated men.

Again the rural councils in some districts are applying to veterinarians for recommendations as to the manner of controlling the local food-supply of man, and municipal veterinary inspectors are being sought in many places, and indeed the fields which are rapidly coming into view for well-trained veterinarians are broadening rapidly as time goes on, and the public demand for proper hygienic or sanitary surroundings is increasing from day to day.

While we should feel greatly encouraged at the prospects of the future, yet I am sorry to have to report a darker outlook in some respects, to wit: One member of the committee reports that he had heard that the attendance has decreased in many of the veterinary colleges, and suggests the advisability of a discussion for bringing about a better attendance, and this phase of our report should, I think, have full consideration. The same gentleman thinks that veterinary education would receive prestige from a report including statistics of attendance at the various veterinary colleges during the last five or six years.

Another member of the committee introduces a number of most important recommendations, which are as follows:

1. A recommendation that the course in all veterinary educational institutions should be increased to four years, allowing the matriculation requirements to remain as they are for the time being, and if this recommendation is adopted, that a suggestion be made in connection therewith that all colleges establish and maintain a chair to teach such subjects as English grammar, composition, rhetoric and perhaps Latin grammar, as it has been our experience that even students possessing a high-school diploma are at times markedly deficient in these subjects.

2. A recommendation that all veterinary colleges increase their educational facilities for the teaching of sanitary science and police, which would include a more thorough training in jurisprudence, more particularly as it pertains to quarantine laws, etc.

3. A recommendation that a committee be appointed to consider and report on the question of reciprocal exchange of state licenses.

4. A recommendation that the number and length of papers

and committee reports presented at the meetings of the American Veterinary Medical Association be curtailed in order that time for discussions from the floor may become available.

5. A recommendation that the American Veterinary Medical Association take steps to publish a veterinary journal along the lines followed by the American Medical Association.

With the hope of introducing something of a practical nature to this Association, the question of the normal temperature of the lower animals, domestic and wild, has been given consideration during the past summer. This has been deemed prudent, because text-books differ so much from one another as well as from the teachings of various institutions, which also differ in regard to the temperature of animals, and I think it may be almost regarded as unfortunate that even the temperatures of individuals in a race of animals vary a good deal in some instances. Thus, one writer of a text-book of high repute tells us that the temperature of the horse, donkey or ox varies from 99.4° to 100.4°, and that the temperature runs down to a slight extent during those hours when the functions of the body are least active, and that anything in the line of muscular exertion increases the temperature very readily. In order to test the maximum and minimum diurnal temperatures of animals, especially the horse and the ox, a maximum and minimum clinical thermometer was advised by a member of this committee last summer, and it was hoped that a great many observations might be recorded for the edification of this Association, but it was not possible to get these instruments made on this side of the Atlantic and the foreign manufacturers have not delivered the order up to the present, although delivery was promised early in August. One possibly good reason for having the thermometer designed to record diurnal maximum and minimum temperatures is that, in cases of fever in the domestic animals, it might be of vast importance to give a febrifuge at any hour of the day or night, as the case might be, when the temperature was highest, and thus carry the patient over a critical center, as it were, and possibly cut short the progressive invasion of the enemy which caused the disease. Again, this question of temperature has been deemed worthy of a recommendation from this committee, because careful observations by a member of it, as well as others, give such a wide range in that which we usually regard as the normal temperature of an animal, and it would be interesting to learn if possible the conditions which occasion these widespread variations. Therefore, it is recommended that a report be made by this Association of the temperature of as many animals, both ordinary domestic and wild animals in confinement, as possible at the next meeting.

Before taking up the individual reports of the various State and Provincial Secretaries, this Committee begs to recommend a request being sent by the Secretary of the A. V. M. A. to various Provincial and State Secretaries requesting them to have their reports made to the Committee on Intelligence, etc., on or before the first of July of each and every year, and that those reports which are not received by that time be held over till the following year.

It is also recommended that the Secretary of the A. V. M. A. have a number of tabulated forms prepared, with suitable headings, for each and every Provincial and State Secretary. I beg to say with reference to these recommendations that I hold in my hand a bundle of most interesting reports from earnest gentlemen in all parts of North America, which, if properly summarized, would make one of the most interesting and valuable contributions to our annual meetings, but coming in as they do, it is impossible for a chairman, who is naturally a busy man or ought to be, to read, mark, learn and inwardly digest these reports and reproduce them in an intelligent way, when they are hurled upon him by postmen in the last days of what I am pleased to call our interregnum. If it is the desire of this Association that these reports shall be read at this time, I believe I have sufficient vitality left to do so, if you have the patience and perseverance te remain quiet and listen with all your ears. If it is not the desiro that these reports shall be read individually, it is recommended that they be handed to the Committee on Publication for their consideration and reproduction.

This Committee is of the opinion that the present method of annual inspection of veterinary colleges is not in the best interests of this Association, especially as it may not promote good feeling, may not—indeed, does not—promote good feeling in all instances toward the Association. Nor is it likely to raise the prestige of the veterinary profession as well as the prestige of the veterinary colleges in the eyes of the public, and such a procedure is unprecedented so far as we know in other professional associations of a similar kind to our own.

The expense of thorough investigation would be out of all proportion to any benefit which might possibly be derived from it, and without thorough investigation the report of such a committee can hardly bear sufficient weight to maintain or elevate the prestige of this Association in a manner which is unanimously desired.

Many of the veterinary colleges of North America are state institutions, and for that reason are required to render annual reports to their patrons or employers, or men higher up, and this report is in some instances conducted according to a clause in the law of the locality, which reads as follows:

"The Executive Officer of the College shall at the close of each year present to the Minister or Commissioner (under whose control the veterinary college is operated) a report of the work of the college in such form as the Minister shall approve, setting forth the staff or corps of teachers, the course of instructions, the students in attendance, the examination results, the income and expenditure, and such general information as shall show the work being done, and this report shall be laid before the Legislative Assembly within the first thirty days of the session next ensuing."

It also duplicates the investigations of the committee of the Department of Agriculture at Washington.

REPORTS OF RESIDENT SECRETARIES

ALABAMA

By C. A. Cary
Auburn

As resident Secretary of Alabama I am directed to report to you on the condition of diseases of live-stock in Alabama during the past year.

The state of Alabama has lost during the past year not less than $1,000,000 from the ravages of hog cholera. This loss could be checked in a great measure but the state has been unable to do much officially because of lack of funds in making, distributing and using anti-hog-cholera serum. The hog industry of the state is such that it has been seriously crippled by the great loss from hog cholera, while the experiments have demonstrated that Alabama can produce hogs at as little cost as any state or country in America. While there is a reliable means of controlling this disease, the farmers of this state have availed themselves of it only to a limited degree.

The cattle tick, which transmits the cause of tick fever, is being eradicated, but not as rapidly as it should. Some of the farmers and stock men in every county of the state are individually exterminating the tick, but in the entire state there are only a few counties that are officially fighting the tick by appropriating funds to coöperate with the state authorities and the B. A. I. The sentiment for tick eradication and the growing knowledge of the necessity for it are rapidly increasing. The prospects for more energetic work in the near future are very bright.

Tuberculosis still exists to some extent among the dairy cattle in dairies located in and about our large cities. The per cent. of infection, however, is not high; and the cities are eliminating it as fast as possible. The work oxen of the logging camps connected with the great lumber companies of the state have been found to be tuberculous. The extent of tuberculosis in the different camps varies from 1 to 50 per cent. At first it was supposed that these work oxen, which live out of barns and stables all the year round, were not infected, but tuberculin tests revealed a surprising degree of infection. These tests have nearly all been confirmed by slaughter tests and post-mortem examinations. These oxen are worked very hard and are kept in pens and range pastures. They are fed largely on cottonseed meal and cottonseed hulls and various mixed feeds. It is possible that hard work, close contact in the barns and feeding large numbers out of the same trough account for the rapid dissemination among them.

During the past winter there was a large number of cases of influenza or infectious pleuropneumonia among horses and mules. The mortality was very high. The types assumed were pleuropneumonia, paralysis of the larynx, pharynx or esophagus and abdominal complications, or what might be called catarrhal fever. In many of these cases the veterinarians were not very successful in treatment, the malignant type of the disease seemed to be too rapid and severe to be checked or controlled by ordinary methods. In fact, many veterinarians report that best results were from little or no medication and allowing the animal to live on pure air, fresh water and without solid food of any kind for several days.

There have been a few outbreaks of black-leg in cattle in various parts of the state, but the loss was relatively small.

The reports or calls for inspection of suspected cases of glanders were very few during the past year. In fact the number of cases were smaller for 1912 than during the past five or six years.

During the year there were a few cases of hemorrhagic septicemia among cattle. The loss was not great. The common diseases, such as colic, ordinary pneumonia, strangles, etc., occurred about as usual.

A most interesting and valuable Supreme Court decision was given by Judge de Graffenreid on the constitutionality of the live-stock sanitary law of Alabama. This decision takes up the question of whether the legislature has the right to delegate to a live-stock sanitary board the power of making rules and regulations to carry out its sanitary police power. A copy of the decision will be enclosed and it is my opinion that it should be published in the *Proceedings* of the American Veterinary Medical Association on account of its great value and importance as the best decision of its kind in America. (Those interested are referred to the Judicial Department, State of Alabama, Court of Appeals, November term, 1911 to 1912. The State of Alabama *vs.* J. W. McCarty, Appeal from Sumter County Court, 2 Div., 27.)

The Veterinary Medical Association of Alabama is in a flourishing condition. The regular annual meetings are well attended and a good clinic is always held in connection with each meeting.

The Veterinary College of the Alabama Polytechnic Institute is growing in attendance. The entrance requirements were raised last year to twelve high school units. In a short time we shall require fourteen units for entrance.

CALIFORNIA

By David F. Fox
Sacramento

The veterinary profession in the state of California is in a prosperous and very satisfactory condition generally.

While the state is a little overburdened with veterinarians, those who have permanent locations seem to be doing a fairly good business, considering that there are more than one hundred thousand automobiles in use in this state at the present time. In this state, I suppose as in others, there are veterinarians continually traveling around looking for better locations.

The state association was never in a better working condition than at the present time. All meetings are well attended and a keen interest is manifested during the discussion of subjects. The Association is divided into two branches, the north and the south; while they are both regulated by the same by-laws, each has its separate organization. During the last two or three years it has become the custom to meet jointly, once a year, alternately in San Francisco and Los Angeles. These meetings are always well attended, as there is a keen rivalry between the two organizations to see which can produce the most interesting program and the largest attendance. It has been the means also of bringing the profession together from all over the state, which is both instructive and pleasant.

A special meeting of veterinarians was called by the Agricultural Experiment Station of the University of California on July 11, for the purpose of consulting how to most efficiently control bovine tuberculosis in this state. The meeting was very well attended, a great many valuable suggestions were made, and seemed to be the starting-point of much good to be accomplished in this state along this line in the near future. Several post-mortem examinations were held on cows which had reacted to the intradermal test, but which had failed to react to the subcutaneous test. All but one showed marked evidence of disease.

Contagious diseases seem to be pretty well under control at present. Some few years ago all the southern portion of this state was under quarantine against Texas fever, but through the untiring efforts of our state veterinarian and the systematic dipping of tick-infested cattle the district has been reduced to one and one-half counties; and they are practically free from tick infestation, but are still held in quarantine simply to safeguard the remainder of the state.

Hog cholera is more or less prevalent in the state in certain localities, and is usually treated with serum with more or less success. The state appropriates money to pay for the preparation and distribution of serum, which is done by the Agricultural Experiment Station of the University of California.

Sheep scabies was very prevalent here a few years ago, nearly every flock being more or less affected. A thorough system of dipping every sheep in the state, which was inaugurated by the U. S. Bureau of Animal Industry and the State Veterinarian, has almost eradicated this disease; nevertheless the B. A. I. and the State Veterinarian are still conducting systematic inspections for this disease. The several counties and the state appropriated funds with which to successfully carry on this work.

Rabies made its first appearance in this state about three years ago and spread with remarkable rapidity, but by the united efforts of municipalities in passing muzzling and other ordinances its ultimate control is assured.

The law providing that all veterinarians shall report all cases of contagious disease to the state veterinarian has proved of wonderful assistance in the control of disease, the veterinarians having coöperated to the fullest extent in complying with this law.

The stallion registration law is being prosecuted very closely, and in a few years will improve materially the standard of the horse-breeding industry in this state.

The law regulating the practice of veterinary medicine and surgery is about all that can be desired. While there are very few prosecutions being made, the law has the effect of placing the licensed graduate on a higher standing in the community than the other man, the business is usually coming to him and the non-qualified man is forced to retire.

The profession is still talking about the meeting of the A. V. M. A. held in San Francisco in 1910, and is looking forward with much pleasure in anticipation of another meeting being held in California, which we hope will be in the near future.

I have mailed some two hundred and fifty letters to the members of the profession during the year and have met with very fair returns, as I am enclosing herewith several applications for membership.

COLORADO

By I. E. Newsom
Ft. Collins

While the past year has not been marked by any startling occurrences, yet the profession of Colorado has made steady advance and shows some increase in its members as well as material advancement in things of veterinary interest.

Our Association has had two meetings of great interest to the members and has decided hereafter to publish its proceedings in pamphlet form. It also appointed a committee to look into the feasibility of placing the A. V. M. A. under a federal constitution, whereby state associations might have voting representation therein.

Our only educational institution, the Veterinary Division of the Colorado Agricultural College, has taken an advanced step in requiring of all those students entering hereafter, four years of veterinary work before a degree can be granted. This puts this school on a par with the highest requirements in America, *i. e.*, high school graduations or its equivalent for matriculation and four years' work of nine months each for graduation. The effect on enrolment in the school will be looked forward to with much interest. It is worthy of note in this connection that two of our veterinarians, Dr. W. W. Yard, of Denver, and Dr. A. G. Brocker, of Steamboat Springs, have offered substantial prizes to stimulate good work on the part of the veterinary students in the college.

The most remarkable outbreak of disease was the invasion of the state by the Kansas horse plague. It, however, reached only a small section of the state, notably the Arkansas valley near the Kansas line.

Hog cholera has been rather common throughout the state, particularly in the San Luis Valley, where it almost ruined the hog industry. Vigorous sanitary police measures were adopted and recent advice from the County Agriculturalist was to the effect that the only affected herd remaining in the valley had been placed under strict quarantine. As usual the diagnosis of this disease was much confused and much useless loss experienced from failure to recognize the condition early. Serum in the hands of most of our practitioners was effective, the serum alone method probably having the preference.

Anthrax was responsible for a considerable loss in the Arkansas Valley during the spring and summer, cattle and hogs seeming to suffer most.

Glanders and rabies were with us but neither seems to be on the increase.

The Experiment Station is undertaking the investigation of what is popularly known as "brisket disease" among cattle. For several years, it has been known at altitudes of 8000 feet and over; it is a winter disease of chronic character; one associated with diarrhea, low fever, large collections of œdematous fluid in thorax and abdomen, swelling of the brisket and cirrhosis of the liver. Some cases taken to lower altitudes are said to recover, otherwise practically all die after a lingering illness.

Infectious anemia in horses seems not to have claimed as many victims as formerly.

CONNECTICUT

By Grove W. Loveland
Torrington

This report must of necessity be, to a considerable extent, a repetition of my report of last year.

Information available indicates that tuberculosis, glanders, symptomatic anthrax and rabies prevail to about the same extent as recorded in my last report. Apparently, hog cholera is increasing, although efforts are being made to keep it under control.

Legislation regarding the practice of veterinary science or the importation of live-stock into the state has not been changed.

Interest in the profession is keen, as evidenced by the unusually large attendance at the semi-annual meeting of the Connecticut Veterinary Medical Association held at Dr. Bland's hospital, in Waterbury, in July, at which the most extensive surgical clinic presented in many years was a feature of much interest to all present. The evening session was devoted to the reading and discussion of papers on live topics of interest to the profession. Many were enthusiastic concerning the fiftieth anniversary meeting of the A. V. M. A., and doubtless many of the members will attend.

At the meeting of the State Board of Examination, held in July, seven applicants took the examination, two of whom were successful and received licenses to practice.

DELAWARE

By H. P. Eves
Wilmington

I do not know that I have very much of interest to report from our small state. I might say, however, that we have a sprinkling of almost all diseases that veterinarians come in contact with in general practice.

As far as I know, we have not been troubled with black-leg until this year, and to my surprise, within the last month there has been reported about twelve cases. Dr. J. R. Kuhns, secretary of the State Live-stock Sanitary Board and Dr. H. B. McDowell have diagnosed the cases, and as far as I have been able to learn, from symptoms found and reported, it appears as though the diagnosis is a correct one. The bacteriological report has not been received confirming the diagnosis. This is the first time to my knowledge that black-leg has been reported in our state.

Within the past few years a State Live-stock Sanitary Board has been created, consisting of the Governor of the state, the members of the Board of Agriculture, which is composed of the members from each county in the state and a veterinarian, who acts as the secretary of the board. This is the nearest approach we have to a state veterinarian. The law provides that the veterinary member shall be a graduate of a recognized veterinary college in good standing, giving a three years' course. The present secretary of the board is not a graduate, but I will not discuss this matter at present. It might be added that a great deal of good work is being done by the board. The state is divided into districts, and in that manner different members of the profession reap more or less benefit, and I consider the state comes in for its share as well.

The greater amount of actual benefit has followed the general preventive treatment of anthrax. The disease has made its appearance, year after year, for the past twenty years. The first year or two deaths were numerous, but thanks to the administration of anthrax vaccine it is under almost complete control. The well-founded supposition is that the infection comes from our numerous morocco factories, the refuse of the factories being drained into the river and carried by tide water to the meadows.

Rabies is too prevalent and more interest should be taken by the state authorities.

Hog cholera ranks high in its devastation. The board is at present taking this matter in hand. The state furnishes the serum and the owner pays the veterinarian, and the work is under the supervision of the state board.

Cerebrospinal meningitis, or so-called forage poisoning, has caused a great financial loss for years in our state, and I am frank to say that very little advancement has been made as to its prevention, although I do believe the death-rate has decreased rather than increased. Some few cases of swamp fever are yearly reported.

Glanders is not common. We have our share of tuberculosis. The state is fairly well protected from further importation of the disease, but as we possess so many tuberculous cows, I cannot see that we are very much benefited. The crusades on the disease are spasmodic, although some good has been done in the way of educating cattle-owners; only a few dairymen subject their herds to the tuberculin test.

Influenza causes great financial loss yearly, both by death and loss of service of the afflicted animals. In my opinion the national government should take a hand, as the disease is imported to us from the Western States.

Tetanus, thanks to the advice and preventive treatment given by veterinarians, has decreased very materially.

Azoturia is another disease following the improved path. Our horse owners, in fact the owners of all domesticated animals, show their appreciation.

The condition of our city milk supply has not improved to any great extent; we have a few dealers that are supplying a good quality of clean milk, but on the whole our milk supply is not meritorious, due to politics having the upper hand. We expect improvement soon.

The veterinarians of the state have organized and have formed a State Veterinary Medical Association. Several meetings have been held and I hope some improvement along these lines will result.

DISTRICT OF COLUMBIA

By R. W. Hickman
Washington

The problems presented by the District of Columbia to members of the veterinary profession as related to the control of communicable diseases of live-stock are more restricted in their scope than in the case of the states which cover much greater areas, and have on account of their agricultural territory and manufacturing interests a larger proportion of domestic animals.

During the past year influenza of horses has not been so prevalent as in former years. Rabies has continued to occur to an unwarranted extent when it is considered that for several years there has been a muzzling order in force by the commissioners of the district. Not only has there been numerous dogs affected, but cases among horses and other stock bitten by rabid dogs have not been infrequent. The laboratory of the Public Health and Marine Hospital Service has administered the Pasteur treatment to a number of adults and children who have been bitten by rabid dogs, most of which could have undoubtedly been averted by proper police enforcement of the existing muzzling order.

There have been very few cases of glanders since the outbreak which occurred in the District of Columbia about two years ago and which was stamped out by the prompt action of the Bureau of Animal Industry, using the complement-fixation method of diagnosis, and following the prompt destruction of reacting animals by thorough cleaning and disinfection of premises.

The greatest interest continues to center in the bovine tuberculosis work, and the District of Columbia presents an example of what may be accomplished in any locality in the control of this disease. When this work was first systematically undertaken in 1910 it was found that upon 556 premises in the District of Columbia, maintaining 1700 cattle, 18.35 per cent. of such premises were centers of tuberculosis infection, and that 18.87 per cent. of the cattle in the District were tuberculous. The system and methods which have been in operation in the eradication work are explained in the Department Year Book for 1910.

By a provision for the reimbursement of owners and the prompt slaughter of all tuberculin reactors, followed by thorough cleaning and disinfection of all infected premises under Bureau supervision, the per cent. of tuberculosis was rapidly reduced and has been kept each year at a level which has shown gratifying progress in the work. The results of the past year's test show only 1.8 per cent of tuberculosis among the cattle of the District.

In the District control work the entrance of dairy cattle is closely guarded. Tuberculin tests are applied to new dairy animals in quarantine upon their entry before they are allowed to mingle with other animals, or they must be accompanied by recent certificates of satisfactory tuberculin tests.

Spreading out from the District the work embraces many herds in the state of Virginia and a number in the state of Maryland, and it has been found that the establishment of many cattle centers in these states free from tuberculosis has been an important factor in securing healthy cattle for the District of Columbia.

As an illustration it may be stated that during the past year the Quarantine Division of the Bureau of Animal Industry coöperated with 203 owners of dairy herds in Virginia and Maryland which were found to be free from tuberculosis. In 56 of these herds the entrance of tuberculosis has, by careful and hearty coöperation and the systematic application of the tuberculin test, been prevented. In 69 herds tuberculosis was found to exist at the beginning of the Bureau's coöperative work, many of which herds were badly infected, but the disease has been eradicated from them. In the remaining 78 herds coöperation started during the past year and they were found free from tuberculosis.

The average per cent. of tuberculosis among 11,050 dairy cattle tested during the past year by the Bureau of Animal Industry in Virginia and Maryland shows a rate of 4.93 per cent. These include a number of herds which were known to be heavily infected with tuberculosis before the test was applied. The Bureau veterinarians, as a rule, receive good coöperation from cattle owners who are becoming more and more interested as they get a better understanding of the matter and realize the importance of the eradication of tuberculosis from their herds.

The two veterinary colleges of the District of Columbia—namely, the Veterinary College of George Washington University and the United States College of Veterinary Surgeons—have been active during the year and graduated nine and twenty-six students respectively. The former has conducted a night school, while the latter runs both night and day courses, and its graduates were divided as follows: ten from the night course and sixteen from the day course.

GEORGIA

By William M. Burson
Athens

As resident secretary for Georgia I have the honor to submit the following yearly report:

Number of practitioners in the state, about 35. Opportunities for practitioners, very good. Increase in live stock 1900 to 1910, 60 per cent.

Association: Georgia State Veterinary Association, W. M. Burson, President, Athens, Ga.; Peter F. Bahnsen, Secretary, Americus, Ga.

State law requires certificate of State Board of Veterinary Examiners before being admitted to practice.

Tick eradication in progress. Completed in ten counties. Active work going on in twenty counties. Many dipping vats have been constructed in counties not actively engaged in tick eradication. State veterinarian's funds for the work, $15,000 for 1913. Cattle carrying ticks not allowed transportation anywhere in the state.

Hog cholera work: Losses 1912, $1,000,000. Hog cholera serum is made under state appropriation by Veterinary Department, State College of Agriculture. Distributed by state veterinarian and direct to swine owners. Serum alone method used. Results good in most cases. Hog cholera appears to be less common so far this year. Price of serum two cents per c.c.

Tuberculosis: Disease not common except in vicinity of larger cities. Tuberculin testing done by state veterinarian in dairies supplying larger cities shows not over 10 per cent. of cows tuberculous. Law requires all cattle for dairy or breeding purposes from other states to be accompanied by tuberculin test certificate.

Glanders: But few cases found.

Black-leg: Sporadic.

Mycotic stomatitis was prevalent in many localities during autumn, 1912.

Strangles, influenza, shipping fever, stable pneumonia were common during winter and spring months.

Epizoötic laryngo-tracheitis: Diagnosis by state and federal officials. The disease occurred as a complication of shipping fever. Treatment was not encouraging.

Forage poisoning: Sporadic.

Hemonchus contortus (twisted stomach worm) somewhat common in certain sections, due to failure to rotate pastures.

Œstrus equi and œstrus bovis common. Many forms of intestinal parasites found in all domestic animals in all parts of the state.

Milk-sick (trembles) said to exist in mountainous part of state.

Cysticerci (measles of beef and pork) may be found in various sections, due to poor sanitation.

Federal meat inspection conducted in one city only. Municipal veterinary milk and meat inspection conducted in two cities.

IOWA

By W. W. Dimock
Ames

The following report of the veterinary situation in Iowa will be confined to brief discussions of the problems and diseases of special importance for the year just past.

The state legislature at its last session discontinued the hog cholera serum plant maintained at Des Moines under the direction of the state veterinarian and authorized and directed the State Board of Education to establish a new serum plant and laboratory at the Iowa State College under the supervision of the president of the college, who shall appoint a director and assistants of said laboratory. The new plant is known as the State Biological Laboratory and is for the purpose of manufacture and distribution of hog cholera serum, toxins, vaccines and biological products. The act also authorizes the regulation of the sale and keeping for sale or use or using hog cholera serum and virus and to provide penalties for the violation of said regulations. It carries with it an appropriation of $35,000 to establish the said plant and carry out the provisions of the act. The director of the laboratory shall upon application furnish hog cholera serum to anyone in the state for use on his own herd. He may sell any surplus outside the state, or when the supply is not sufficient he may purchase from any reliable source serum or biological products for distribution. The director has the power, and it is made his duty, to establish and declare the standard potency for hog cholera serum, and any serum offered for sale in the state must have the degree of potency established by him. Any person, firm, company or corporation, before selling or offering for sale in this state hog cholera serum, must first make application to the director and receive a permit, for which he shall pay the sum of $25 and give a bond of $1000. Failure to comply with or violation of these provisions is punishable by fine or imprisonment according to the provisions of the act.

The director of said laboratory or the state veterinarian or their duly qualified deputies or assistants are hereby authorized to seize and forward to the state laboratory for examination samples of any serum or virus used or kept for use or for sale in this state, at any time or at any place, under the police and health regulations in force in this state. The director of the state laboratory shall have power to condemn or destroy any serum or virus which he deems to be unsafe.

The procuring and distribution of virulent blood or virus is wholly in the hands of the director. Any person wishing to use or sell virulent blood for the vaccination of pigs against hog cholera or swine plague must first receive from the director permission to do so and under such regulations as shall be specified, these restrictions not to apply to veterinary members of the Animal Health Commission or representatives of the United States Bureau of Animal Industry.

Hog cholera is very prevalent throughout the state and is causing serious losses. The great majority of farmers accept and acknowledge the preventive value of hog cholera serum, but hesitate to vaccinate because of the unsatisfactory results that have come from using serum of a low potency. The eradication work being carried on in Dallas County, Iowa, by the United States Department of Agriculture in coöperation with the state and college, is progressing smoothly and promises to be of great value in demonstrating the practicability of eradicating hog cholera. The work is outlined as follows: The United States Government to furnish and administer the serum; the state veterinarian to maintain quarantine regulations; the State Agricultural College to do educational work among the farmers; a committee from the townships of the county to furnish the necessary data.

Hemorrhagic septicemia in cattle has increased in prevalence during the last year and has caused very heavy and serious losses in many herds in the state. In the college herd several animals have died each year for the last four years from this disease, most of them dying suddenly or before assistance could be rendered, others suffered from a chronic form, yet failed to be benefited by medical treatment. In a recent outbreak among young stock at the Iowana Farms, Davenport, Iowa, several animals died that showed before death the rather typical symptoms and upon post-mortem examination revealed lesions that are considered characteristic of the disease. Several (5) calves, two to six months old, showing marked symptoms of the disease recovered, but we are not at this time prepared to say whether we should give credit to the medical agents employed or assume that they were mild cases. Twenty have been vaccinated with vaccine prepared by the Bureau of Animal Industry and no further cases have developed, but it is not yet time to draw conclusions.

During the fall of 1912 there occurred in the western parts of the state many cases of cerebrospinal meningitis, or encephalomyelitis, in horses. Little opportunity was offered for extended investigation. We did, however, succeed in positively diagnosing the disease as the same as occurred in Kansas and Nebraska, and upon examination of the tissues found lesions that are considered more or less typical of the disease. The fact that the disease did not reach Iowa until fall and disappeared with the first frosts no doubt prevented, in Iowa, the heavy losses suffered by Kansas and Nebraska.

During the last year we have encountered many cases of tuberculosis in chickens—out of seventy birds sent to the laboratory for diagnosis twenty-three were found to be affected with the disease. Dr. Menary, municipal inspector of Cedar Rapids, has during the past year incidentally met with fifteen cases in the local markets.

We have obtained some very gratifying results from the vaccination for roup. The vaccine used was prepared from organisms isolated from raw surfaces beneath the necrotic membranes in the mouth. Two different forms of micrococci and a sarcina, but no bacilli, were used. The vaccine was standardized to one billion per c.c., and one-tenth c.c. was the amount administered. Two hundred and eight fowls were vaccinated, about one-half of which were sick at time of vaccination. Previous to this time thirty-five fowls had died and following the vaccination only seven died.

Diarrhea in young chicks has been reported to us from every section of the state. We have made no extensive studies, but from the history and symptoms and superficial laboratory examinations suspect the existence of three forms of diarrhea, viz., intestinal coccidiosis, that form due to the Bacillus pullorum, and a non-specific form due to improper feeding and care.

Chicken cholera and allied diseases which we have not positively diagnosed are with us the year round and cause serious losses.

White diarrhea, or acute milk infection, has been the cause of losses among young pigs. While the disease occurred in enzoötic forms, we do not consider it to be due to a specific organism, but rather to a large class of toxicogenic microörganisms. The organs of the body outside of the intestines were free from infection or tissue change. Infection was undoubtedly taken into the alimentary tract while sucking from the filthy, contaminated udder of the mother. The marked emaciation and weakness of the sick animal can be partly accounted for by indigestion and loss of fluid from the body, but there is also the probability that absorbed toxins played an important part.

Navel ill (omphalophlebitis) has caused loss of many valuable colts. Educational work among the farmers along the line of prevention is certainly needed.

Other problems and diseases discussed in the report for last year remain about the same and need no further mention at this time.

MAINE

By A. Joly
Waterville

Much has been accomplished since my last report. The legislature of last winter was with the veterinary profession. The office of Live-stock Sanitary Commissioner was filled by a layman. He was removed by the Governor and a veterinarian was honored by the position. Immediately upon entering his office a resolve was presented and passed by both houses for the appropriation of $100,000 (being double the amount appropriated by the previous legislature) for the control of contagious diseases among domestic animals of the state. Fifty two veterinarians were appointed his deputies.

No live stock can enter the state of Maine without a permit; and inspection at place of destination is required. Our veterinary laws have been modified and are up to date. We have an active state association of 52 members, and 41 were present at the April meeting held in Portland. Glanders, tuberculosis, hog cholera, bovine infectious abortion are among the communicable diseases we have had to deal with last year. For the first time in the history of Maine, the Waterville State Fair will have three veterinarians to act as judges in the exhibition of horses.

MANITOBA

By C. D. McGilvray
Winnipeg

I beg to submit herewith my report as Resident Secretary, concerning matters pertaining to the veterinary profession in Manitoba.

The Veterinary Association of Manitoba has at present 128 members. The requirements for qualification and registration in the Association for those graduating subsequent to the year 1898 are the possession of a diploma or degree in veterinary science from a recognized veterinary school or college having a curriculum of not less than three sessions of six months each, together with a successful pass of a required examination and payment of the prescribed fees.

The practice of veterinary medicine and surgery for gain, hire, or reward by any person other than those registered under the Veterinary Association Act renders them liable to prosecution. The association holds two meetings during each year, at which matters relating to the profession and its advancement are placed before the members and papers presented on veterinary subjects. The proceedings of the association are printed each year and copies distributed to its members.

Regarding prevalent diseases throughout Manitoba, as you are no doubt aware, the control of contagious diseases comes under the Health of Animals Branch of the Department of Agriculture, Ottawa. The diseases dealt with are those scheduled under the Animals Contagious Diseases Act.

Of these maladies the ones which we have dealt with in Manitoba during the past year are:

Glanders, which is only found to a small extent and in isolated outbreaks. The total number of horses destroyed for glanders in the province of Manitoba during the past year was 24. All told, we submitted to the mallein test 3398 horses and mules.

Hog Cholera: This disease has also made its appearance in Manitoba, chiefly near urban centers and among hogs which are being fed kitchen refuse and garbage containing pork products, obtained from hotels and restaurants in the larger towns and cities. During the past year fifteen outbreaks of cholera were dealt with and 249 animals slaughtered, either diseased or as contacts. Mange affecting horses is also met with to a slight extent and is chiefly traceable to horses coming from the Western ranges.

During the past year mange was detected affecting 42 horses. Sheep scab was found to a small extent, affecting 62 sheep.

In the case of tuberculosis and actinomycosis, these diseases are exempted from the operation of certain sections of the Animals Contagious Diseases Act, but animals affecting with these conditions are not allowed to be exported. All animals imported or exported for breeding purposes are submitted to the tuberculin test by officers of the Department of Agriculture, and tuberculin is also furnished to practising veterinarians on the condition that they report the result of the test on charts which are supplied for that purpose. Any animals which react to the test are permanently ear-marked.

Black-leg makes its appearance in certain sections of the province, in which it appears to be more or less indigenous. The department, in such cases, furnishes vaccine for protective inoculation, and which is employed largely with success by owners of cattle in affected districts.

A considerable mortality takes place among horses here from somewhat obscure maladies, termed under the generic name, "swamp fever," although it is not so prevalent as formerly. It would nevertheless appear that the name swamp fever, as commonly used here, is applied to several conditions rather than to one specific affection.

Joint-ill, affecting foals, would appear to be increasing in prevalency, and treatment still appears to be unsuccessful, although some claim to have a good measure of success with the anti-streptococcic serum treatment and the administration of iodine, the iodine being used in a preventive manner by direct application to the navel at, and following, time of birth, and in affected foals given internally by the mouth.

Regarding meat inspection, this is dealt with under the Meat and Canned Foods Act, and abattoirs which are engaged in an export trade in meats (that is to points outside of the province), automatically come under the operations of the Act and are placed under inspection.

There are four abattoirs in the city of Winnipeg under inspection, at which a staff of thirteen veterinary inspectors is maintained.

Regarding milk inspection, this comes under the local boards of health for the various towns and cities in the province, and they are proceeding along lines to regulate the handling of milk and the testing with tuberculin of the cattle belonging to dairies supplying milk for sale in certain of the larger towns and cities.

MARYLAND

By F. H. Mackie
Baltimore

My report for the year 1912–13 must of necessity prove a very tame affair. Nothing by way of diseases out of the ordinary has claimed our attention.

Glanders has become a curiosity in this state, thanks to the diligence of our practitioners and the valuable assistance of the B. A. I.

Anthrax has not cropped out in the state during the last four years.

Hydrophobia, although at times cropping out, as usual, at the most unexpected places, is rare.

Our troubles of most magnitude are tuberculosis and hog cholera. I am glad to report that we are in better condition regarding both of these than I have ever known. Tuberculosis, due to our quarantine laws, is being held down to our own cases and education is prompting the owners to determine the condition of their stock and remove diseased ones from their herds, and although I cannot give accurate estimates, I am sure that our percentage of tuberculosis in live-stock is on the decrease.

Hog cholera has bothered us very much for the last few years and our loses from that source alone have approximated $100,000 annually. We, however, have secured an appropriation to establish a laboratory for the production of serum for the treatment of this trouble, and as we are satisfied as to the efficiency of this treatment we look for decided results as soon as the money gets to working. Notwithstanding the lack of diseases of a contagious nature and the increase of automobiles in the land, our veterinarians look prosperous and happy.

MASSACHUSETTS

By Francis Abele, Jr.
Quincy

As resident secretary for the State of Massachusetts I submit the following annual report for the year 1913.

841 horses were killed for glanders against 952 last year. Of these, 395 came from Boston. The complement-fixation test is used in doubtful cases.

During the year a bill was passed by the state allowing a maximum of $50.00 for glandered horses. There had previously been no compensation.

3113 cattle were found tubercular, of which 473 were out of state cows. The preceding year showed 2800. For the state cattle there was paid an average price of $27.00 per head.

66 cases of tuberculosis in swine were reported compared with 106 last year.

151 animals were killed and 40 are in quarantine for rabies. 32 people were bitten. We are in the midst of a return of rabies.

1534 cases of hog cholera were reported. 674 died. Dr. Paige, of Amherst Experiment Station, has done some valuable work for the state in this connection and has reported to the Massachusetts Veterinary Association the results of his work at one of their meetings.

481 cases of black-leg were treated by the state, as were 124 cattle and 10 sheep for anthrax.

Numerous milk bills continue to come before the legislature. One, which required the labeling of all out of state milk, passed both houses, but was vetoed by the governor as not tending to improve the quality of our milk supply. The really good bill, which hangs fire so long, is objectionable to the farmers and veterinarians simply because it is to be enforced by the State Board of Health, which is extremely unpopular.

It would appear to your resident state secretary that a practical veterinarian on the State Board of Health as a member might greatly improve matters.

An attempt has been made to remedy the unsatisfactory results from state inspection of slaughtering. No ability had been required of the inspector. The inspection was often made at night when the inspector returned from his shoe shop or other daily toil. He would find carcasses already to be stamped. Inspection now must be made at times of slaughter and in all cities at least one inspector must be a registered veterinarian.

The chief of the Department of Animal Industry, Mr. Walker, has asked the legislature to localize the responsibility for inspection of cattle and to eliminate all other agents. His request seems to us well founded, as farmers are visited by seven sets of inspectors with six different sets of authority: (1) The local board of health; (2) the State Board of Health; (3) the local inspector of animals; (4) the district bureau inspector; and (5) if this milk goes to Boston, the Boston health board inspector. Besides these (6) the local milk inspector, and (7) the state milk inspector may all help enliven his otherwise dull existence. As no two of these have the same ideals or regulations, farmers drop the cow business rather than attempt to comply. For instance, an inspector forbids horses in the same stable with cows, and as most New England barns are arranged for both, the farmer refuses to keep cows where he cannot see the money to build a new stable.

So far I have not seen the inspector who would recommend fly screens. It may come later.

The Massachusetts Veterinary Society has had a pleasant and successful year. Dr. Charles Perry, of Worcester, was elected president, and Dr. W. T. Pugh, of Southbridge, secretary. Both are members of the A. V. M. A. Dr. Williams kindly came from Cornell and gave us the same illustrated talk on sterility which he gave to the A. V. M. A. at Indianapolis. Dr. Paige, of Amherst, Mass., gave us an illustrated talk on hog cholera, greatly appreciated by the members. Dr. Palmer, from Mulford's, discussed the paper in a very able manner. Dr. Leary, of Tufts Medical College, gave us a talk on vaccinators and bacterins in such a lucid manner that it made us feel quite familiar with a very troublesome subject. The session wound up with a harbor trip.

The Humane Association is about to open a new free hospital for animals in Boston.

MISSISSIPPI

By E. M. Ranck
Agricultural College

In this state veterinary matters are making progress. We have nearly twenty-five assistant state veterinarians, who are doing very good work in assisting in the control of animal diseases. These men are located in various sections of the state and can visit outbreaks of disease almost as soon as it becomes known and thus save time and expense. They are paid by the county boards of supervisors or the people for whom the work is done.

During this past year we have had five different outbreaks of anthrax. It was necessary to quarantine entire counties, and in some instances order the vaccination of all the animals in that district. Where we can get the people to cremate the carcasses of animals we have very little trouble in stamping out the disease. We had one or two reports of vaccine not being efficient, but as a rule the commercial vaccine that we used was satisfactory.

Black-leg: This disease has broken out in several sections of the state during the past year. There were no very great losses, however, as the people in the locations where it broke out were familiar with the symptoms and resorted to the vaccine treatment at once. We have had several reports of rabies, but not so many as last year. We hope to be able to get proper legislation relative to this disease at an early date.

We have had several outbreaks of glanders in different sections of the state during the year. The animals were tested with mallein, condemned, killed and in some instances appraised and paid for by the county board of supervisors who are authorized to do this under House Bill No. 11 of our state laws.

We have had very good success with our hog cholera serum. We recommend the simultaneous method where it is possible to secure the services of a competent man to inject the virulent blood. The serum alone, however, has been doing excellent work where the animals were exposed to the disease right after injection.

We have had a number of cases of forage poisoning in the lowlands of the state.

Tuberculosis is being eradicated from dairy herds and large beef herds of animals which are being raised by up-to-date and well-informed breeders by means of the tuberculin test. Since the last report we have tested nearly a thousand animals to be used for dairy and beef purposes.

Since the first of January we have imported about six thousand animals from other states, mostly horses and mules. We do not think that the inspection of these animals is sufficient. In many instances the certificates are made out by men who do this work in a wholesale way, and charges are made against some veterinarians in several stockyards, by the men who import these animals, that they do not even make a close physical examination of the animals. It seems to be the rule to issue certificates simply to get the fee. Many of these animals develop violent cases of distemper shortly after being brought into the state and quite a number die. The people who import them appeal to the state authorities for assistance and when we refer to the inspection made, we are told that distemper is something that cannot be prevented in shipping. On the other hand many dealers inform us that the veterinarians at these stables practically insure these animals for a certain fee, and as near as we can learn the insurance is based upon the injection of some form of vaccine. We have had a number of these instances to occur and hope that some means can be devised to stop these losses among our people.

The work of tick eradication in this state during the last year has made wonderful progress. Several counties have been declared free and above the quarantine line.

During the past year a veterinarian has been appointed as a member of the State Board of Health, which shows a recognition of our services in matters of health. At the next meeting of the legislature we expect to pass a veterinary practice bill and some other laws of vital interest to the veterinarians of the state.

MISSOURI

By F. F. Brown
Kansas City

I am pleased to report that the veterinary profession of Missouri is in a prosperous and healthful state. At the recent annual meeting, at Kirksville, upward of sixty-five veterinarians were in attendance and about twenty new members were added to the organization.

A campaign is being waged against tuberculosis in this state, under the direction of Dr. Samuel Sheldon, state veterinarian, with gratifying results, the intradermal method being employed. During the year ending January 1, 1913, 10,310 head of cattle were tested by state officials, 337 of which reacted. Of the number slaughtered no lesions could be found in 8 head. The Federal authorities at Kansas City have during the year applied the thermic test to 6826 head, with the result that 136 reacted and 39 were regarded as suspicious. Of those slaughtered, 42 head showed no lesions. On account of the unsatisfactory results attending the use of the thermic test during extremely hot weather, such as has marked the summer just closed, an agreement has been reached whereby a state official may administer the intradermal test at the yards at Kansas City until more favorable weather. It is estimated that of the total number tested at Kansas City about 50 per cent. enter Missouri.

Texas fever is being rapidly eradicated from our state, there being but small areas in four counties under quarantine at this time.

Black-leg is fairly prevalent and exists over scattering areas.

Hog cholera does not appear to be as generally prevalent as last year, but is quite uniformly scattered over the state. The indications for and the application of both serum and virus are being better understood and swine raisers are making more use of this method of protection. Twelve serum companies are now operating in and about Kansas City with the general report that they are unable to supply the demand. The output during the past year from these companies was approximately 3,327,990 c.c. of serum, one company alone sending out 509,330 c.c. The federal supervision that has been recently inaugurated is having a most wholesome effect in placing a more reliable product on the market. Several plants suspended operations for as much as thirty days, or until they could conform to the requirements.

The number of cases of scabies among sheep is limited to 30 head, these few, however, being reported from 19 separate counties. It is suggested that these few found their way into the state largely through shipments.

52 cases of glanders were reported up to January 1, 1913, showing a decrease of 45 head over 1912. But 5 cases have been reported from Kansas City up to August 1, showing a remarkable decrease in this city. It is thought that the uncompromising war made by the veterinarians and team owners against the open watering-troughs is in a great measure responsible for the almost suppression of this disease. Bucket fountains have been gradually installed to supplant the open style, until there remains but a single open fountain in Kansas City today.

Rabies still appears to be generally prevalent. The Sophian Hall Alexander Laboratories during the past year have applied the antirabic treatment to 223 cases. 104 brains were received by them for examination, 83 of which showed the presence of Negri bodies.

The peculiar climatic conditions ordinarily present in Missouri make favorable for strongylosis, but the past year has been so dry that but few reports of parasitism have been received.

With a live, active state organization and the semi-annual gathering of the great Missouri Valley Veterinary Association at Kansas City yearly, with her 450 members strong, we have every reason to think that the stimulus given the profession by affiliation with these organizations is both helpful, encouraging and uplifting, and that the veterinary profession in this domain is rapidly rising to a higher plane.

MONTANA

By A. H. Cheney
Miles City

I sincerely regret that I cannot be present at our annual meeting, but am pleased to inform you that Dr. A. D. Knowles will be with you all as a delegate from Montana. Herewith I beg to submit my annual report.

Governor Stewart, last winter, in making up his appointive officers, removed Dr. M. E. Knowles as our chief executive officer. It is our opinion that Dr. Knowles' executive and educational ability has been equaled by few and surpassed by none and that the state of Montana owes to the doctor a well-earned debt of gratitude which they will never be able to repay. Very fortunately, our loss has been replaced in the appointment of Dr. W. J. Butler as our state veterinarian. Dr. Butler is well and long acquainted with the needs of western range conditions and well qualified to act as our chief guardian over our stock industries.

Dr. D. E. Salmon, father of the B. A. I., we are informed, is within our state, with headquarters at Butte, where he is busily engaged overseeing the production of hog cholera serum.

Legislation: Through the active interest taken by a few of the members of our state association they succeeded during the last legislature in getting passed a state practice law, for which we are all very thankful and greatly pleased. Under this act we now have fifty-three licensed veterinarians and thirty-three licensed farriers.

Reimbursements for animals destroyed on account of any infectious or contagious diseases are now paid in full of the assessed valuation, the county paying one half, the state the other.

Tuberculin testing is compulsory of dairy herds and of all cattle from which milk or its products are sold to the public. We are sorry to report that a number of infected dairy cows have got into the state, where the origin of infection was apparently traceable back to some eastern point, notwithstanding that our state laws require all dairy and breeding cattle imported into the state to be accompanied with tuberculin test charts.

Tuberculosis: Tuberculosis among our dairy herds is being rapidly reduced by our three specially appointed deputies whose sole duty it is to tuberculin test our dairy herds.

Glanders: Glanders is occasionally found in four or five counties of the state, usually making its appearance among livery, contractors and old "cow outfit" stock. Our unbroken range horse is particularly free from the disease.

Lip and leg ulceration: This is only occasionally with us and infected areas are wide apart.

Scabies among our cattle still exist in a few counties of the state. Just recently the Department of Agriculture, Washington, D. C., released one county from quarantine. Among our horses scabies is seldom seen and our sheep are free from the disease.

Scabies among the coyotes of eastern Montana is very prevalent. Some few years back, Dr. M. E. Knowles experimentally inoculated some twenty-five coyotes with scabies, setting them free in several different localities of eastern Montana in hopes he might succeed in lessening their number, if not exterminating them. The doctor's highest hopes have been more than gratified. Dealers in hides and pelts report that from 25 to 90 per cent. of coyote skins show infection to some degree. Range riders frequently report seeing dead coyotes badly infected with scabies that have sought shelter in some vacant cabin or haystack. They become so emaciated that the ranch boys frequently kill them with a pitchfork or such weapon. Just recently, the State Sheep Commission in conjunction with the state veterinarian have taken steps to establish a "coyote farm," placing Dr. M. E. Knowles in charge, for the purpose of further pursuing these inoculations. Such measures we deem wise for all states to establish where these animals are at all numerous.

Black-leg seldom makes its appearance.

Dourine: We are sorry to report that dourine is within our state, three counties now being in the infected area. We would feel very much gratified if this disease could be kept within the present infected area. However, permit us to apprise you of the possibilities of this disease being present within your own state. How long it has been with us we do not know, or whence it came we know not. The federal authorities, with Dr. A. W. Miller in charge, are giving us most liberal and efficient assistance in stamping out the disease. Dr. Mohler's complement-fixation test is certainly a "friend in need;" without its aid only a very small per cent. would be detected or even suspicioned. Up to the present time several hundred cases have been found. The stallions are being castrated and the mares destroyed.

Epizoötic lymphangitis has been found affecting a few horses in the extreme eastern part of the state.

"The hairless pig:" During the winter of 1910 our attention was called to some trouble existing among the pigs. The trouble being a new one to me and after diligent consultation with my library deriving no assistance, I made frequent inquires in my travels from the various farmers and stockmen, and to my surprise I found the trouble existed or had existed in quite a few localities of the state. Quite a few farmers of Dawson and Custer counties have observed this condition. Statements from those familiar with this trouble are so conflicting that to question them seems only to bewilder one the more. Only on one occasion have I ever had an opportunity to see any of the "hairless pigs." This was in Dawson county in September, 1910. The pigs, six in number, had been farrowed on the morning of my arrival. My notes state: "Sow of mixed breed, in good flesh, weight about 300 pounds." "Pigs appear to have been carried full term, well developed and nourished." Autopsy on three disclosed uniform lesions: "Liver apparently greatly enlarged. Intestines, both serous and mucous membrane inflamed. Heart presenting gelatinous infiltration about the base." Trust you will pardon my intrusion upon your valuable time with my lengthy report upon this subject, but I fear this trouble may become of considerable importance and hope we may get some enlightenment through the A. V. M. A.

I trust this meeting will be the banner one of education and a royal good time.

NEVADA

By Winfred B. Mack
Reno

The conditions for practice are growing better throughout the state. When the price of live-stock was low and the quality of the animals produced was somewhat inferior there was little demand for veterinary service. This was generally the case throughout the range country. However, these conditions are rapidly vanishing. The quality of Nevada live-stock has been materially improved during the last few years and compares favorably with that in other portions of the country. The price of animals has been high for several years and their production profitable. There is some tendency toward a more diversified farming, dairying and hog-raising are being developed in several regions, and poultry is becoming something of an industry in some sections. These conditions are creating a demand for skilful service in general practice, at the same time making the "way" of the quack more difficult. There are several localities in the state where qualified men would find an abundance of work and could build remunerative practices.

A quarantine law was passed at the last session of the legislature under the provisions of which entrance to the state of infected animals is refused. By proclamation the Governor has prohibited shipment into the state of dairy and breeding cattle until they have passed the tuberculin test; of horses, asses and mules until they have passed the mallein test; of stallions and jacks until they have passed a physical examination for dourine; and of any animals affected with any infectious or contagious disease. Formerly there were no restrictions of any kind. The office of state veterinarian was abolished and authority vested in a state quarantine board of five members. The more efficient control of outbreaks of infectious disease within the state was provided for.

The health of domesticated animals generally is good. There have been no serious outbreaks of infection. Of course there have been appearances of infections of various sorts in divers places; that is a condition which is still inseparable from the live-stock business, but those which have appeared have been quickly exterminated without heavy loss. Strangles and influenza have levied their usual annual tax upon the horse raising business. Hog cholera has appeared a few times, but it was not allowed to gain much headway. The same may be said of anthrax. There were a few bands of sheep affected with "swelled head" last spring, but the loss was light. Scabies in sheep is practically eradicated from the state. The Federal quarantine has been raised from all but three counties and it is expected that these will be released soon. There have been a few scattering cases of equine anemia during the year. There is some tuberculosis in cattle and hogs, more particularly in certain of the dairy districts, but it has not become sufficiently serious to arouse the owners to action. In the same districts infectious abortion in cattle is a somewhat serious problem.

NEW BRUNSWICK

By D. McCuaig
McAdam Junction

As resident secretary of New Brunswick for the American Veterinary Medical Association, I have the honor to report that the present season has been a prosperous one for the live-stock interests and, as would be anticipated, members of the veterinary profession are enjoying good business generally.

There are twelve qualified veterinarians practising in New Brunswick.

NEW MEXICO

By Marion Imes
Albuquerque

My report as resident secretary for New Mexico will necessarily be very brief. Efforts were made last winter to secure the passage of a veterinary practice act, but without success.

The conditions obtaining relative to the health of live-stock are very satisfactory. There has been no outbreak of contagious or infectious disease during the past year. The season has been a very dry one and there have been considerable losses from want of feed and water, but very few losses from disease of any kind.

The work of eradicating sheep and cattle scabies from the flocks and herds of New Mexico has been continued with good results. The Federal Quarantine on account of cattle scabies has been removed from New Mexico.

NEW YORK

By J. F. De Vine
Goshen

As resident secretary of the state of New York, I am glad to report that matters pertaining to live-stock interests and the veterinary profession have been steadily improving during the past year.

Glanders and tuberculosis as usual in our state have been receiving the most attention.

Tuberculosis: The control work of tuberculosis has shown much improvement in some respects. Owing to the great number of dairy animals in our state, the work of the state department has necessarily been limited largely to educational. But as evidence of the advantage of this character of work, I wish to point out that while it was necessary but a few years ago to urge stockmen to have tuberculin tests made in an effort to free their herds from tuberculosis, their attitude is so changed today that the requests for tests are greater than the state funds make it possible to handle with promptness. It is now practically impossible to sell a pure-bred animal in our state without furnishing reliable assurance that great precautions have been taken to ascertain if the animal is free from tuberculosis.

Our records show that nearly twice as many animals have been examined for tuberculosis during the past year as were examined for a like period the year previous, and that the per cent. of the diseased animals is about 4 per cent. less. While it is true that some of these examinations have been what we term retests, still it is nevertheless evidence of an advance in the control of tuberculosis.

Glanders: Glanders is a serious problem in some of the larger cities, particularly Greater New York.

The writer under the instructions of the Commissioner of Agriculture has been doing some special work during the past month in New York City, with the hope of formulating and perfecting methods whereby a systematic inspection of all equine animals in the city may be carried out in the near future, with the immediate destruction or strict quarantine of all animals found to be glandered.

Infectious swine diseases have been equally as prevalent, if not more so than last year. There has also been an occasional outbreak of anthrax, black-leg, contagious ophthalmia in cattle and the usual occasional epizoötics of green sickness among horses.

Veterinary Science and Education: Veterinary practice in our state seems to be about the same as it has been for the past few years, but we are proud of the fact that by an act of the legislature, chapter 676, laws of 1913, another state veterinary college has been established at New York University, City of New York, giving free tuition to one student from every assembly district. This college was formerly the New York American Veterinary

College, and was one of the oldest and most dignified schools in America. Real estate has been donated by the New York University as a site for a new veterinary college and new laboratories are now being installed at the Medical Department of the University. The course has been lengthened, the faculty reorganized, and creditable additions have been made, securing the services of most capable men on the subjects which they will teach. We predict a great future for this college, where students and clinical material are so abundant.

NORTH DAKOTA

By W. F. Crewe
Devil's Lake

At this time this state has a horse valuation in excess of $80,000,000 and a cattle valuation in excess of $20,000,000. With the high valuation of these classes of animals in this state the practice of veterinary medicine has become quite lucrative. There are but few veterinarians, if any, that do not find the acquisition of an automobile necessary to take care of their practice.

Practically all our graduate veterinarians are members of our local association, and a large percentage of them are members of the American Veterinary Medical Association.

Our law regulating the practice of veterinary medicine having been in force for many years we find only twelve registered non-graduates practising at this time.

Our laws for live-stock sanitary control work are in excellent shape. The last session of the legislature passed some acts improving the laws existing at that time. The annual appropriation for field work was increased from $10,000 to $15,000.

The live-stock sanitary authorities are enforcing more rigid measures for the eradication of glanders, and believe the near future will see this disease well under control in this state.

However, it seems that one thing follows another, and a large number of cases of dourine have been located during the present year. The disease has been principally found on the Standing Rock Indian Reservation and is being handled by the Federal authorities, the diagnosis being made by the complement-fixation test, and no doubt a much larger number of cases are being found than would be by physical inspection, as but few of the cases show clinical symptoms. A few cases have been found outside of the reservation, although it is hoped the disease has not spread to any extent throughout the state.

Considerable hog cholera has existed during the past year, but fair success has been secured in controlling this disease by immunization. Up to this time the serum only method has been used.

NOVA SCOTIA

By W. Jakeman
Glace Bay

Some time ago I had a letter from Dr. C. J. Marshall, Secretary A. V. M. A., asking me to send a report of the condition of animals in this section for the year.

I am pleased to report no outbreak of a contagious nature, nothing out of the ordinary run of cases. In fact, I have not seen a single case of tetanus in the last seven years and our influenza cases are of a very mild type.

OKLAHOMA

By Chas. H. Jewell
Fort Sill

As resident state secretary I find it rather difficult to report fully upon matters pertaining to the profession in the state, since I am in the military service and somewhat out of touch with the working of the veterinarians in civil life. But since I have been chosen to represent this state, I will give the Association what information I have been able to obtain, mostly through the courtesy of Dr. C. E. Steele, of Oklahoma City, who is secretary of the State Veterinary Medical Association, and by consulting the last report of the Live Stock Inspection Department.

During the last session of the state legislature a veterinary practice bill was enacted, which will no doubt in the end put the profession on a better standing within the state. After its passage it was found to have some points which were not satisfactory to all, and which will no doubt be amended at the next meeting of the legislature. This bill made it very easy for nongraduates to register, since all that was required of them was to have practised two years within the state for compensation and submit the names of ten freeholders or stock owners along with their petition for practice, the signers to state that they were qualified and of a good moral character. The new law requires all graduates to be from schools recognized by the B. A. I. in order to register as graduates, and since there were a number of graduates from schools not recognized by the U. S. Department of Agriculture, these men had to register as non-graduates and this gives rise to a considerable dissatisfaction with the new law as it was enacted.

During the past two years the state has placed above the federal quarantine line 8550 square miles of territory, containing 5,452,800 acres, upon which are kept 250,000 cattle. This work has been under the supervision of the Live-stock Inspection Department and they have accomplished a great task, but could have done much more had they not been hampered by lack of funds, the appropriation available only amounting to $20,000 annually. The state as a whole does not seem to awaken to the financial benefits to be gained by raising the embargo on the infested counties.

All animals for interstate shipment must be examined and certified as being fee from any contagious or infectious disease. This inspection is made by veterinarians approved by the Live Stock Sanitary Board.

There has been no widespread animal diseases within the state during the year, but there have been isolated cases of glanders, forage poisoning, black-leg and a considerable amount of hog cholera; for the latter the use of the anti-hog-cholera serum has been quite general and, so far as I can learn, quite successful.

The year has been one of good crops, and since this state depends greatly on its agricultural products for its prosperity, it offers in the future a good opening for young men entering the profession. There are many rich farming districts without a graduate practitioner. All such towns have one or more non-graduates of the "old school." Their places must soon be filled with fine up-to-date young graduates, and this will help to uplift the profession in the state.

ONTARIO

By D. McAlpine
Brockville

The By-laws of the A. V. M. A. require that as resident secretary, I shall submit a report concerning recent veterinary facts.

As Dr. Grange is more in touch with veterinary conditions in Ontario than I, he will furnish the necessary information in his report as chairman. Speaking of veterinary conditions in the eastern part of the province, they are bright. Practice has been good and valuation of live-stock is high. There has been no contagious or infectious diseases in this end of the province. We have the Ontario Veterinary Association, which is in a strong condition, as is education and legislation and other conditions of the whole province.

OREGON

By W. Dean Wright
Portland

The Live-stock Sanitary Law was passed at the last session of the legislature, over the Governor's veto, and is now in operation. It provides for a Live-stock Sanitary Board of six members and the appointment of a state veterinarian, who acts as secretary for the appointed board. The law is very broad in its scope, giving the Live-stock Sanitary Board increased authority over all live-stock sanitation within the state. $50,000 has been appropriated for the enforcement of this law. According to the statutes, each county is authorized to appoint a county veterinarian at a salary of $5.00 per day, but not to exceed $400.00 a year. This phase of the law seems very weak. In a recent judicial decision it was held that a county veterinarian has no authority to make a personal charge for services while in the performance of his official duties. When a state quarantine is issued, subject to removal if the animals so quarantined will pass a satisfactory examination (tuberculin or mallein test administered by the state veterinarian or his authorized deputy), and animal or animals are found free from disease they may be released from quarantine, and no personal charge can be exacted for his services, irrespective of the amount of time or labor that may be necessitated in giving such an extended examination. No reputable veterinarian can afford to sacrifice his practice and give his entire time to a tuberculin or mallein test for the meager sum of $5.00 per day.

At the last legislature a bill was introduced that had for its purpose the repeal of that part of the statutes that provides for and authorizes the appointment of county veterinarians, but it did not pass its final reading. That this part of the law should be strengthened is very apparent and some change will of necessity have to be made before this seemingly weakness can be effectively remedied.

Senate Bill No. 313, introduced February 6, 1913, to amend this law relating to the practice of veterinary medicine and surgery, was unfavorably reported from the committee on account of its being introduced so late in the session, and the bill was then indefinitely postponed. This amendment was introduced for the direct purpose of legalizing reciprocity with examining boards from other state or provinces and provided, "And nothing in this act shall be so construed as to prevent the examining board from accepting applicants without examination upon the submission of evidence of graduation and payment of examination fees who have passed an examination held to be an equal in practicability and thoroughness under the jurisdiction of the federal government or other state boards, or provincial boards, on a basis of equality of educational standard and mutual recognition." The statute already provides for the issuance of licenses to veterinarians who have passed an examination under the jurisdiction of the federal government, and had this amendment been enacted, this bill would have been one of the most advanced steps taken toward reciprocity in the licensing of veterinarians. No adverse comment was heard regarding the amendment, and had it not been for its late introduction it no doubt would have met the legislature's approval.

During the summer an epidemic of rabies obtained in Portland and vicinity and threatened to become uncontrollable. A great number of animals were infected and two young men died in the hospital after suffering all the tortures of rabid convulsions. A very rigid and effective muzzling ordinance was enacted by the city commission, requiring the muzzling of all dogs during the months of July, August and September, except those confined or held on a leash. This ordinance is being strictly enforced and it is a daily occurrence for the municipal judge to penalize violators. The public is well satisfied with its enforcement and but very little of any discontent is voiced by the city dog fanciers. The Live-stock Sanitary Board has issued a quarantine of the territory directly surrounding Portland, requiring all canine animals running at large to wear muzzles.

An ulcerative ano-vulvitis has been prevalent among the dairy animals of Clackamas County. A rigid quarantine has been placed on this territory and several infected bulls have been destroyed. The use of local antiseptic solutions has very effectively placed the epidemic under control.

The Pacific Northwest now raises enough hogs for local consumption and with this increased hog population has come epidemics of cholera. A number of infected areas throughout the state have been reported during the last year, but at no time did the infection become widespread. The use of anti-hog-cholera serum and prophylactic measures have kept the contagion confined to limited areas.

Black-leg in Columbia County caused a little anxiety among the breeders of some fancy pure-bred cattle during the early winter months. The early administration of blacklegoids controlled the threatened epidemic.

An advanced step has been taken by the Live-stock Sanitary Board in protecting show animals from the infection of tuberculosis, by requiring all bovine animals exhibited at live-stock shows to have passed an approved tuberculin test.

The cattle scab quarantine placed on all cattle in Lake and Klamath Counties has been removed. The destruction of all extensively infected animals, coupled with spraying or dipping of the exposed, has practically eradicated the disease. A careful inspection of the quarantined area failed to reveal any evidence of the presence of the scab mite.

Contagious abortion seems to be less prevalent than last year.

Sheep scab is reported to exist more or less in Douglas County. The inaccessibility of some of the mountainous portions of this county renders it difficult to gather all sheep for dipping. Heretofore a few undipped sheep have strayed down to the valleys during the winter months and reinfected the sheep that were dipped during the early summer.

With but few exceptions, parasitic diseases are as prevalent in Oregon as elsewhere. Stephanurus dentatus, the kidney worm of the hog, is not known to exist in Oregon; the parasite has never been found in Oregon-grown swine.

PENNSYLVANIA

By Frederick H. Schneider
Philadelphia

The last legislature was generous with the Veterinary School, the Veterinary Medical Examining Board and the State Live-stock Sanitary Board. The school was given all it asked for, viz., $60,000 for maintenance for two years. The Veterinary Medical Examining Board was given $2500 to enforce the Veterinary Practitioner's Act. The question of raising funds for this purpose was submitted to all the licensed men in the state and a majority of them voted to raise the annual license fee from one to five dollars. Governor Tener did not consider it right for the Commonwealth to make laws and then place a tax on those protected for enforcing it. He recommended that the legislature appropriate the money for this purpose and his recommendation was complied with.

The State Live-stock Sanitary Board was given $441,000 for enforcing the laws for two years. The position of state veterinarian was created when the Department of Agriculture was organized. The salary provided at that time was $2500 per year, but at the last session of the legislature this salary was increased to $4000 per annum. The salary of the deputy state veterinarian was increased from $2100 to $3000 per annum.

But few new duties are imposed on the board; no less responsibility is placed on the members. More authority is given the state veterinarian and agents for the purpose of expediting the work and keeping down expense. The state veterinarian is made executive officer of the board; the other members will remain the same as under the old law. Practically no change will be made in the working plans of the board.

The purpose of the new law is to prevent, suppress and control the transmissible diseases of animals in Pennsylvania. Among the diseases mentioned are glanders, anthrax, black-leg, contagious pleuropneumonia, rinderpest, hemorrhagic septicemia, foot-and-mouth disease, Texas fever, sheep scab, mange in cattle and horses, hog cholera, fowl cholera, rabies, dourine, generalized tuberculosis and tuberculosis of the udder.

Veterinarians are required to report these diseases to the state veterinarian.

Poultry was not mentioned in the old law. The term "domestic animal" is defined now so as to include poultry with horses, cattle, sheep, goats, pigs, dogs and cats.

The board will have authority to destroy animals and poultry that are afflicted with transmissible diseases, and to enter enclosures where they are believed to be kept, even against the will of the owner, if such action is deemed necessary for the protection of the health of domestic animals. Cattle or horses reacting to a tuberculin or mallein test must be reported to the Board.

The law for handling interstate cattle has been strengthened. Bovine animals under six months old and those older, for immediate slaughter, may be brought in without examination or test. Cattle for temporary exhibition purposes can be brought in only on a special permit from the state veterinarian. All others must be tested in the state from which they are to be shipped by the proper official before they can be accepted in Pennsylvania. Where such animals get into the state without the proper test the board may hold them up at any point and test them, and the test will be made under supervision of the Board.

The old law was easily enforced in regard to importing high-class dairy or breeding cattle and was seldom evaded. At the same time thousands of "scrub" cows and bulls were brought into the state under the names of "stockers," "feeders," or "butcher cattle" and sold in our native herds without an official examination. It was the intention of the old law that such cattle should be officially examined and free from disease. The persons who evaded the law by shipping dairy or breeding cattle as "feeders," "stockers," etc., usually lived in another state and there was no way of reaching them. The commission merchants and cattle dealers who handled cattle in the state merely acted as agent for the shipper and were not subject to the provisions of the old law. In most cases when such animals were tuberculous the farmer or purchaser was the loser and the only one amenable to the law.

The old law required that the sale and use of tuberculin in Pennsylvania must be reported to the board. The same requirements are now placed on the sale of mallein as well.

Many biological products are being placed on the market by the various manufacturers. Some contain the organisms that produce disease. This is especially true in reference to the sero-simultaneous method of treating or preventing hog cholera. By means of commercial serum hog cholera has been spread in certain places. In some cases such products are made by men who are unqualified, incompetent and poorly equipped to do such work. Provision is made in the new act to require biological products used in diagnosing, treating and preventing disease in animals to be endorsed by the United States Bureau of Animal Industry and their use reported to the board.

In a few cases animals react to the tuberculin test and the owner desires to keep them for a time to raise their calves and fatten them for beef. Under the old law such animals were tagged and placed in quarantine. The owner can sell or dispose of such a condemned animal only after obtaining a permit from the board. It frequently happened that the tag was lost or removed, another cow substituted for the one in quarantine, and it was often impossible for the board to trace or locate such an animal. The new law will permit branding and the identity of the animal can be more easily established.

No change was made in the amount of appraisement allowed by the state for animals condemned and destroyed to prevent the spread of transmissible diseases.

Under the new law skim milk, buttermilk and separator slops must be pasteurized by heating them to 178° F. before they can be legally used as food for calves and pigs.

The Butchers' Indemnity Act, which was passed in 1903, was repealed May 2, 1913. Hogs and cattle slaughtered for food since that time, and the carcasses found too extensively diseased to be used for food, cannot be paid for by the state as was formerly done.

The number of cases of glanders reported during the past year was somewhat more than in previous years. The regulations for handling the disease were more satisfactory for the reason that a better system of diagnosis was made available. The plan adopted was to appraise and destroy physical cases with open lesions, submit the exposed animals to the ophthalmic mallein test, collect samples of blood for laboratory examination from those that reacted or were suspicious to the eye test, and submit them to a subcutaneous mallein test. Where the animal gives a positive reaction to the eye test or the complement-fixation test, or both, it is appraised and destroyed. Autopsies are conducted on all such cases and so far no mistakes have been made. This is a decided improvement over the old plan of placing those that gave a suspicious reaction to the subcutaneous test in quarantine for two months or more and retesting them.

The state still produces its own tuberculin, mallein, hog-cholera serum, etc., and distributes it free to those in Pennsylvania. Hog cholera is well under control. The serum (alone) method of vaccination is used almost exclusively and at present there appears to be no reason for adopting the simultaneous method.

Veterinarians are no longer required to report cases of epizoötic lymphangitis. It is believed that the true form of this disease does not exist in the state and that what was formerly believed to be epizoötic lymphangitis is sporotrichosis, which is of no more economic importance than actinomycosis.

There has been no decided change made during the year in the meat hygiene service. There are ten agents employed by the board. The state is divided into ten districts and each district is under the supervision of one of the agents. The work of the agent is confined principally to slaughtering animals in the rural districts and inspecting meat-shops and slaughter-houses in towns where the local authorities have no system of meat inspection. The efficiency of the meat hygiene service could be greatly increased by amending the present law so that these agents could be assigned to do other kinds of work for the board and the board could assign meat hygiene work to the registered veterinarians of the state as it can in looking after transmissible diseases.

The number of cattle tested for tuberculosis has increased steadily since the board was organized in 1895. The year 1912 made the greatest increase of any other year during the seventeen years. The test was applied in 1534 native herds on 20,534 head of cattle. Of this number 2424 animals reacted and were appraised and slaughtered under inspection.

The physical examination without the tuberculin test was conducted on 2054 head of cattle, in 365 herds, and 294 head were condemned and destroyed by this method. Of the total number inspected and tested, 12.03 per cent. were found to be affected with tuberculosis. Under the Butchers' Indemnity Act the board was authorized to appraise and pay for cattle and hogs slaughtered and found to be too extensively tuberculous to be used for food. The board paid for 1471 such carcasses. There were 26,304 head of interstate cattle for dairy and breeding purposes subjected to a physical examination and tuberculin test. Of this number 313 head were condemned.

Milk hygiene work in the country districts was conducted by local veterinarians under the direction of the board during the year 1912. Inspections were made on 23,728 dairy farms. They were reported to Harrisburg as excellent, good, fair or bad. There were but few excellent dairies for the reason that this class was reserved for certified dairies. The bad dairies were the ones considered dangerously unsanitary by the inspector.

These dairies were reinspected and if still found bad the owner was told of the specific objections. The case was reported to the board and a defect notice was served on the owner, who was then given a certain number of days to remove the objectionable features or quit the business. This plan had the desired effect and satisfactory results were obtained in all cases without bringing prosecution.

The work of horse breeding under the direction of the board has been carried on during the year of 1912. There were 2344 stallions licensed, of which 923 were registered and sound, 4 very highly commended, 27 registered but unsound, 1359 unregistered but sound, and 31 unregistered and unsound. County fairs were attended by the director or his assistant, horses judged and talks on subjects of interest to horsemen given. Local horse shows, horse parades and similar enterprises were visited and promoted. The usual educational campaign was conducted by means of bulletins and circulars as in past years.

PHILIPPINE ISLANDS

By Archibald R. Ward
Manila

Rinderpest: The general policy of the Bureau of Agriculture, Government of the Philippine Islands, in combating rinderpest by quarantine with the aid of the Philippine scouts, has been continued during the year.

The sick animals are not killed but isolated, and on an average only 58 per cent. die. The slaughter of 42 per cent. of the animals attacked by rinderpest that otherwise would have recovered would be an expensive matter to the Government for compensation and would constitute an even greater economic loss to the community. The isolation of animals probably exposed is the most that Philippine conditions warrant.

The progressive covering of territory in searching for concealed rinderpest and combating the infection has involved work in eight provinces and sub-provinces. Work of this character remains to be done in five more provinces. During the early part of the year a campaign against an extensive outbreak of rinderpest covering two provinces in the island of Panay was brought to an apparently successful end. Minor outbreaks during the year were suppressed in seven provinces. Figures for the week ending June 28, 1912, show eight provinces in which cases occurred and twenty-three towns known to be infected. Compared with the previous year this shows a gain of three provinces and twelve towns. To this might be added eight provinces in which rinderpest has been discovered and apparently suppressed during that period.

An encouraging feature is the restricted district in which rinderpest infection apparently exists at present. At the present writing all known infection is restricted to the north of Manila Bay on the island of Luzon. A less encouraging feature of the situation is that the territory in which campaigns are being conducted or which must be covered in the future contains 32 per cent. of the cattle and carabao of the Archipelago. Besides this, it should be noted that the absence of the practice of fencing, the pasturing of animals of villages together and the normal movement of animals across the country irrespective of roads or even trails constitute a set of conditions which are obstacles to the control of rinderpest and in fact alone are responsible for its continuance in any particular locality.

In much of the remaining infected territory very few restrictions against the free movement of animals beyond natural barriers, like mountain chains, exist. The Bureau has, however, succeeded in obtaining twelve kilometers of fence, which is patrolled by inspectors, and is located at a strategic point which with the aid of the mountain chains practically bisects the infected territory. Furthermore, in this territory a number of centers have been recognized in which rinderpest assumes a very mild form with a low death-rate, a circumstance that adds immeasurably to the difficulties of combating the disease. In one province particularly, the death-rate during a recent outbreak was as low as 33 per cent. of the animals recognized as attacked.

During the year July 1, 1912, to June 30, 1913, 4731 cases of rinderpest with 2787 deaths were reported. This corresponds to a death-rate of 58 per cent. For comparison, it may be noted that the *Census of the Philippine Islands* contains the statement that in 1902, 629,176 cattle and carabao died of diseases, chiefly rinderpest, which number comprised 43 per cent. of the total number in existence prior to 1902. At the present time there are estimated to be 1,435,832 animals in the Archipelago. The reported deaths from rinderpest during the past year comprise in round numbers 0.002 per cent. of the total number of cattle and carabao.

In the campaign against rinderpest the Veterinary Division of the Bureau of Agriculture spends approximately 600,000 pesos ($300,000) a year. On July 1, 1913, there were employed on the work 43 veterinarians (7 on leave), 1 entomologist, 47 American and 237 Filipino live-stock inspectors, together with 9 office employees. In addition to the force employed by the Bureau of Agriculture, the United States army had at this time on duty approximately 839 officers and enlisted men of the Philippine scouts.

Foot-and-Mouth-Disease: This disease has been recognized in one province only and involved 480 carabaos and 14 head of cattle.

Research: The Veterinary Research Laboratory of the Bureau of Agriculture is performing an important work in furthering knowledge of surra and rinderpest, the two great veterinary problems of the Philippines.

A specialist in veterinary entomology has been conducting a series of experiments directed toward definitely determining the species of fly responsible for the dissemination of surra. Representatives of several genera of common horse-flies were tested and eliminated as possible factors, but recently *Tabanus striatus* has been incriminated. The whole attention of the man conducting the work may now be turned to the study of breeding habits, etc., with reference to devising more effective preventive measures against surra.

The veterinary pathologist of the research laboratory devotes his attention largely to the pathology of rinderpest and clinical manifestations of the disease. He has under way a piece of work involving a very extensive study of the gross and microscopic lesions of rinderpest, a work which merges into the study of the problem of the etiology of rinderpest.

A thorough study of the results of the use of anti-rinderpest serum has been made and the results seemed to justify abandoning the use of serum alone as a measure against rinderpest.

The study at the laboratory of the peculiarities of the transmission of rinderpest and viability of the infective agent under various conditions, has yielded results of far-reaching value in guiding the quarantine measures enforced in the campaign in progress.

Cattle Importation: In the past one of the greatest obstacles to the successful progress of the campaign against rinderpest has been the importation of work and beef animals from Hong-Kong and from French Indo-China. Shipments from both of these sources frequently arrived infected with rinderpest and foot-and-mouth disease. The regulations of the Bureau of Agriculture at present impose a quarantine of three months and as a result none are imported. The demand for freshly slaughtered beef in Manila is now satisfied by the importation of Australian range cattle, slaughtered in quarantine at a place on Manila Bay thoroughly isolated from native cattle. This is necessitated by the existence of contagious pleuropneumonia among the Australian cattle. The present policy inaugurated after a decade of freedom in cattle importation is being enforced only in the face of very determined opposition from cattle importers and similar interests in the foreign countries involved. Consequently, the Bureau of Agriculture is under constant pressure to alter its cattle importation regulations, which, however, cannot be done without seriously jeopardizing the campaign against animal diseases being carried on.

University of the Philippines: The popularity and success of the College of Veterinary Science, University of the Philippines, constitutes one of the brightest features of the progress of veterinary affairs in the islands. Established three years ago with a curriculum of four years, the college was strengthened the next year by lengthening the course to one of five years of nine months each.

Happily at the time of the foundation of the college there were men on the board of regents who appreciated the necessity for high and identical standards for veterinary and for medical education. Among them were Murray Bartlett, now President of the University of the Philippines, a fact that augurs well for the continuation of a policy of uplifting the veterinary profession by giving its recruits an education commensurate with the problems that it faces.

During the first seven months of the college clinic, there were entered 510 cases of disease, distributed among 457 animals. These figures for a period at the very beginning of such a clinic are gratifying and give evidence of the need for general practitioners.

At present there are but two properly trained graduate Filipino veterinarians in the islands, and to one of these, Dr. Victor

Buencamino, belongs the credit for the organization and conduct of the clinic mentioned above.

Now, at the beginning of the fourth year of instruction, thirty-five students are receiving instruction, and of these eleven are freshmen.

Veterinary Practice Act: The Philippine Legislature at its last session passed the Veterinary Practice Act, which is considered good. His Excellency, the Governor-General, has the matter of the personnel of the board under consideration at the time of writing and there is every prospect that within a short time veterinarians of the Philippines practising veterinary medicine legitimately will receive adequate protection.

The greatest immediate usefulness of this Act will be to prevent cruelty to animals in the city of Manila where the most brutal forms of quackery are constantly practised.

TENNESSEE

By M. Jacob
Knoxville

The past year in Tennessee has been marked by continued improvement in matters pertaining to veterinary science. There are in this state at the present time about 180 licensed veterinary practitioners.

The official organization, known as the Tennessee Veterinary Medical Association, held its fourth annual meeting in Knoxville, at the University of Tennessee, on November 20 and 21, 1912. This organization, although still in its infancy, is already exerting a wonderful influence toward bettering conditions which directly affect public health, the live-stock industry and the veterinary profession. The next annual meeting will be held in Memphis during the month of November of the present year.

The veterinary profession received further consideration during the recent session of the legislature, when advanced veterinary sanitary laws were passed. The title of live-stock inspector was changed to state veterinarian.

The work of tick eradication is being vigorously pushed by federal and state authorities, and we have every reason to feel that within another year the entire state will be practically free from ticks. Sheep-scab, which has been recognized in different sections of the state, especially middle Tennessee, has been almost entirely eradicated.

A disease of considerable importance which has been more or less prevalent for several years in Tennessee, as well as in many of the other Southern States, is what has been termed "black-tongue in dogs." It is an unusually fatal disease, the mortality running as high as 95 to 98 per cent. of the treated cases. Practically every line of medicinal treatment has been resorted to, with generally unsatisfactory results. It has every indication of being a microörganismal disease, but all attempts at experimental transmission have been unsuccessful. It occurs most frequently during warm weather.

It appears to be a disease principally of the digestive tract, with quite uniform symptoms in all cases. It is characterized by an acute inflammatory condition of the mucous membrane with subsequent ulceration, beginning, as a rule, in the mouth and extending to the œsophagus, stomach, intestines, etc. In many respects this disease answers the description of Stuttgarter Hundeseuche, although the favorable prognosis which is usually claimed for this disease is not true of "black-tongue." As the name of this disease is rather misleading, I will take the liberty of referring to it in the future as Southern dog plague. I am in hopes that by the next annual meeting of the American Veterinary Medical Association I will be able to give more definite information with reference to the etiological factor of this highly fatal canine disease.

In addition to those which I have already mentioned, the following infectious diseases have been recognized in Tennessee during the past year: hog cholera, hemorrhagic septicemia, Johne's disease, rabies, glanders, anthrax, influenza (virulent form), black-leg, pink-eye in cattle, tuberculosis, and infectious abortion.

From an economic standpoint, hog cholera is undoubtedly the most important disease just at this time, for it is safe to estimate the losses during the past year in Tennessee amounted to from $2,500,000 to $3,000,000.

TEXAS

By R. P. Marsteller
College Station

The law regulating the practice of veterinary medicine was amended by the Legislature in such a way that it would have destroyed its usefulness. However, Governor O. B. Colquitt realized the importance of protecting the live-stock interests against unqualified practitioners and vetoed the bill.

The public is beginning to feel the need of qualified veterinarians and we are receiving inquiries from many towns and counties for qualified men. Within the last year about twenty-five qualified men have located in the state.

At this time the house and senate finance committees have allowed an appropriation of one hundred thousand dollars for establishing a college of veterinary medicine at the Agricultural and Mechanical College of Texas, College Station, Texas. We are hopeful that it will receive favorable consideration by the legislature and Governor Colquitt.

The Live-stock Sanitary Commission is doing all in its power to control contagious and infectious diseases; they are badly in need of large appropriations. The commission has never had more energetic and capable officers than Dr. E. R. Forbes and Chairman W. N. Waddell. They have appointed capable deputies in various parts of the state and they are insisting on the best inspection.

Dr. Hubert Schmidt, who graduated from the A. and M. College of Texas, in 1908, and from the Royal Veterinary College, Berlin, Germany, in 1912, has been made assistant veterinarian of the Texas Agricultural Experiment Station. Dr. Schmidt will give his entire time to research work.

UTAH

By H. J. Frederick
Logan

There has not been much progress along veterinary lines in this state during the past year. We have a veterinary society that meets twice a year, but it is not very well attended. A new board of veterinary medical examiners has been appointed by the governor during the last meeting of the legislature and examinations are now given applicants in order that they may practise in this state. Quite a number have taken the first examination. An effort was made by the veterinary society during the last session of the legislature to improve conditions in this state, by having more efficient laws enacted and properly enforced regarding live-stock sanitary conditions, but our efforts were defeated. We are struggling along as best we can under existing conditions and expect to do better next time.

The diseases of animals existing in this state are much the same as described in previous reports. Hog cholera is beginning to make its ravages known in this state and many hog raisers are now inoculating their hogs with hog-cholera serum to protect them against this disease.

All of the localities affected with anthrax and symptomatic anthrax are now vaccinating the animals and very few losses are reported.

Contagious abortion is still prevalent among mares and cows and is becoming a great menace to the stock industry of this section. The Bureau of Animal Industry is no longer coöperating with the state officials in testing cows for tuberculosis. However, the bureau men are doing efficient work in the eradication of scabies and general control of infectious and contagious diseases. The Agricultural College is doing much to disseminate proper knowledge regarding veterinary science. There are not only courses of instruction given in this work at the college, but lectures are delivered in different parts of the state in live-stock communities, under the direction of the extension division, regarding the diseases and their control and the necessity of calling in competent aid whenever necessary. The live-stock sanitary laws of this state are not what they should be and the ones we have are not strictly enforced, but we hope for betterment. Prospects seem good.

VERMONT

By F. A. Rich
Burlington

It gives us great pleasure, even at this late date, to be able to announce that, through an act passed by the last session of the Vermont legislature, a state board of veterinary registration and examination has been created. We have striven for a long time for such recognition and protection in Vermont and we feel that we can now look forward to a real, although possibly not rapid, elevation of the standard of the profession in the state.

Any person who had practised veterinary medicine and surgery in the state for two years prior to the passage of this act was permitted to register as an "existing practitioner," and he received from the state board a license to exist as such. Hereafter none but graduates of some recognized veterinary college need apply for registration and license to practise in the state, and they must submit to such examination as shall be prescribed by the state board of veterinary registration and examination.

The Vermont Veterinary Medical Association has at present over forty active members, of which several have recently applied for membership in the A. V. M. A., and this we regard as further evidence of the dawn of an era of progress in the veterinary profession in Vermont. At present there are only six members of the A. V. M. A. in the state.

There is little of interest to report in regard to infectious diseases in the state. The occurrence of rabies at Arlington, Vt., recently created a little excitement in that locality, but it is yet too early to determine the extent of the trouble. This is the first authenticated case of rabies reported in the state for several years.

There has apparently been about the usual number of cases of glanders, black-leg and hog cholera, but malignant necrotic stomatitis in pigs has been unusually prevalent. Heretofore the disease seemed to be confined to the west-central part of the state, but during the past few months the writer has found typical cases of the trouble in both the northern and the eastern portions of the state.

During the past three years the official testing of cattle for tuberculosis has been curtailed to a marked extent by the limited appropriations ($40,000 per annum) made available for that purpose. About 275,000 head of cattle have been tested in the state since 1894, of which about 20,000 were condemned and slaughtered. The state continues to pay the owner 75 per cent. of the appraised value of cattle condemned and slaughtered. The maximum of appraisal is $50.

WASHINGTON

By J. T. Seely
Seattle

Conditions in the state of Washington during the past year have been kind to the live-stock industry; no serious outbreaks of disease among live-stock have been evident.

Horses shipped into the state at this time require physical inspection only; the mallein test as required by many other states prior to interstate shipment is a regulation which we would like to see adopted by Washington.

Physical inspection is not a sufficient safeguard against glanders; no doubt animals pass the state line and later prove to be the nucleus of a glanders outbreak.

We destroy typical reactors to the mallein test, suspicious cases are held for a retest and dealt with accordingly.

The state appropriation permits of considerable tuberculin testing and this work is carried on systematically and to a considerable extent.

Cattle shipped into this state, if for dairy purposes or for breeding, must be tuberculin tested; beef cattle, physical inspection only.

We have about one hundred and fifty graduates in this state and our requirements for graduates are that they must all pass the state board examination.

At the last meeting of the state board, held at Wenatchie, there were nine applicants for the examination.

Dairying is being carried on extensively and Washington boasts of farms where this art is carried on as perfectly as in any state in the Union.

Dr. S. B. Nelson, who has held the office of state veterinarian for the past eighteen years, left the office on June 12; the doctor has grown up with the live-stock industry of the state of Washington, keeping pace with it step by step and proved himself an able and efficient man for the office which he has just vacated.

Our last legislature made provisions to appoint a board consisting of three men and under this board will be the state veterinarian and grain, fruit and dairy inspectors.

The Washington State Board of Veterinary Medical Examiners was followed at Wenatchie by a meeting of Washington Veterinary Medical Association.

WYOMING

By Benjamin F. Davis
Cheyenne

At the request of Dr. O. L. Prien, Laramie, Wyoming, resident secretary of the American Veterinary Medical Association, I submit the following report of live-stock conditions in the state of Wyoming for the year 1913.

The estimated value of live-stock in the state of Wyoming at the present time is $67,606,000; this includes sheep and goats, which are under the control of the State Board of Sheep Commissioners. The valuation for dairy cattle and swine will gradually increase in this state from year to year, as certain portions of our state are adapted to the raising of swine and dairy cattle and these localities are being stocked.

Our last legislature appropriated $28,800 for the use of the state veterinarian. This does not include the appropriation for the reimbursement of owners whose horses were destroyed on account of being infected with glanders.

There are at the present time twelve graduate veterinarians who are engaged in private practice in the state. In fact there are many more empirics engaged in practice in this state than there are qualified men.

Our last legislature failed to pass an act regulating the practice of veterinary medicine, regulating public service of stallions and jacks, and requiring the tuberculin testing of all dairy cattle within the state.

Glanders: From September 30, 1910, to September 30, 1912, 71 horses were destroyed on account of being infected with glanders, 29 of which were either infected or exposed to glanders at the time they were shipped into the state. 21 belonged to a grading outfit, 7 showed clinical lesions of glanders and farcy a short time after arrival in the state. The health certificate accompanying this certificate was issued by an empiric. The state will pay two-thirds the appraised value of 32 head of the horses destroyed. About 1124 horses were tested with mallein and 3741 head were clinically inspected.

From September 30, 1912, to August 18, 1913, 26 horses were destroyed on account of being infected with glanders and the owners will be paid two-thirds the appraised value at the next session of our legislature.

I find that the greatest number of horses infected with glanders are in livery stables, freight outfits and stage lines. Perhaps this is due to the fact that stage and freight horses are watered from the same buckets or troughs and fed from nose-bags. In only two instances have we found horses infected with glanders on the open range. In each instance the horses were broken horses turned out by the owner in hope that nature would overcome the disease, which they suspected to be chronic catarrh. These horses were alone when found and I might state at this time that I am of the opinion that the range-raised Wyoming horse is free from glanders and has little or no chance of exposure. Our horses feed on the open and water at running streams. I have never seen a clinical case of glanders or known of one found at any of our public range-horse sales. Thousands have been inspected, but comparatively few have been tested with mallein in the state, as I am of the opinion that to test wild and unbroken horses with mallein is impracticable. We depend entirely on the blood test, as made by the Pathological Division of the Bureau of Animal Industry, Washington, D. C., for diagnosis.

Tuberculosis: This disease I have never known to affect our range cattle. It is very likely that a few cattle in our dairy herds at the present time are affected, as they were originally imported from eastern states where the disease is known to affect dairy cattle to a greater or less extent. In the past year 59 head of cattle, purchased from James Dorsey, of Gilberts, Illinois, were imported into the state, accompanied by a health certificate and test chart issued by Dr. A. Tyler, of Elgin, Illinois, License No. 30. 18 head out of the 59 reacted to the tuberculin test, made by myself with the assistance of two other veterinarians; 2 were slaughtered under Federal supervision and the disease found at autopsy; 1 was slaughtered in the presence of the owner and two veterinarians, and the autopsy proved that the disease was extensive. The remainder I intend to slaughter in the near future.

Dourine: This disease is unknown within the state of Wyoming and is not suspected at this time. Several stallions affected with coital exanthema were blood tested for dourine and blood was forwarded to Washington and diagnosis proved negative.

Cattle Scabies: In the quarantined area in the year 1911 the per cent. of cattle infected to the number inspected was 3.19 per cent.; for the year 1912 it was 1.81 per cent.; and this year's work, ending July 31, shows 0.55 per cent. It is indeed a very hard proposition to eradicate cattle scabies in cattle which range on the open; but with the assistance of the Bureau of Animal Industry and the coöperation of our cattle owners I am sure that the time will come when Wyoming cattle will be free from scabies. Our reports show that in the past year we inspected

172,155 head of cattle and found it necessary to dip 71,709. Cattle were dipped in a solution of tobacco and sulphur, exposed animals being dipped once and infected ones twice; second dipping in from ten to fourteen days.

Equine Anemia: This disease is still prevalent in certain localities within this state. I know of no satisfactory means of controlling or treating it at this time. It has caused considerable loss in the past few years in that section of the state known as the Laramie Peak country.

Rabies: Not a known case of rabies has been reported to this office for investigation in the past year. Two years ago there were a number of cases in the vicinity of Cheyenne. Seven persons were bitten and availed themselves of the opportunity of taking the Pasteur preventive treatment.

Black-leg: A greater part of our state is known to carry blackleg infection in the soil. The practical stockman vaccinates his stock and as a result the losses from this disease within the entire state are comparatively small.

Necrobacillosis: A few calves in one outfit the past winter were affected with calf diphtheria. The disease responded to care, feed and antiseptic treatment with the loss of but one calf. I have noted a form of necrotic scratches, due, in my opinion, to secondary infection by the Bacillus necrophorus. This is not serious and readily responds to treatment.

Cryptogamic, or Forage Poisoning: Personal investigations have been made of this disease affecting horses in three counties. All affected animals or those showing symptoms of the disease died. Medical treatment in my hands proved very unsatisfactory. Preventive treatment, change of forage and range, was satisfactory

Summing up the situation as to the condition of live-stock in our state in the past year, it would seem to me that the conditions are the very best that could be expected. Our losses from infectious or contagious diseases have, in my opinion, been the least in years.

Dr. Mohler: Gentlemen, you have heard the report of the Committee on Intelligence and Education. What is your pleasure with reference to it?

Dr. Lyman: Mr. President, it seems as if the Committee on Intelligence must have had it in for the Publication Committee in presenting that document. However, I would like to move that the report be received, and, as there are a lot of recommendations in it, that it be referred to the Committee on Resolutions. (Motion seconded.)

PRESIDENT MOHLER: It has been moved and seconded that the report of the Committee on Intelligence and Education be received and be referred to the Committee on Resolutions. All in favor of this motion will please say, aye; those to the contrary, no. The ayes have it.

The next business before the Association is the report of the Committee on Legislation. I will call on Dr. W. Horace Hoskins for the report.

REPORT OF THE COMMITTEE ON LEGISLATION

BY W. HORACE HOSKINS, Chairman
W. G. HOLLINGWORTH JOHN P. TURNER
F. A. BOLSER JAMES ROBERTSON

Mr. President and Members:

As chairman of this committee for the past year, permit me to say that a part of our efforts were expended to so modify the sale and control of habit forming drugs, that its provisions would not in any way unjustly or unwisely interfere with the practising veterinarian who elects to furnish medicines in conjunction with his services. After several interviews with the sponsors for this measure and the chief exponent of the bill, Representative Harrison of New York, the desired changes were conceded and the bill as it will appear in the calendar of the sixty-third Congress, will not controvert the proper use and dispensation of these drugs in our practice and at the same time accomplish the much to be desired purpose of relieving humanity of the fearful toll she annually pays in destroyed lives from the improper use of narcotics.

Our chief efforts have been continued along the lines of lifting from our profession the humiliating position of our relations with the army in the United States.

Those of you who have followed the plans and efforts of the committee and I might add here that we have tried very hard to let not a single member of this body escape his plain duty; not a single man of our number but upon whom we have called for public service in that he should know better his representative in Congress and should at least have a correspondence acquaintance with the senators of their respective states.

That you most potently respond to our frequent calls upon you for service is best testified to by the fact that in the House, the directly representative body of the people, you attained the unusual and exceptional victory of passing our bill on the unanimous consent calendar and though this calendar contained some eighteen bills on that day and fourteen of these measures were reached, this bill was the only one that obtained favorable consideration; your committee cannot adequately express their appreciation of the splendid country-wide campaign you conducted, in that not a single Representative of that body of 396 men but what felt the justice of our cause, and speaking for 95,000,000 of our own country and more than 5,000,000 in our colonies, approved and indorsed your appeals for this proper recognition of our profession.

It is an unusual experience and somewhat exceptional indeed, that a bill neither political nor economic, passing upon the unanimous-consent calendar of the House, should fail in the Senate: but the traditions of an oft-failed legislative proposition, the long-remembered attitude of army officials toward our profession and the prejudices that have long existed have made the war department in the past, an opposition to overcome beyond our efforts.

The story of army veterinary service is told in great detail by Garrison Steele in the *American Journal of Veterinary Medicine*. It is well worth a careful perusal by every interested veterinarian and I will not go into details of our long unsuccessful battle.

But let me turn your faces forward and to point the future duties as your committee now sees them, that those who may follow up the work we have done may not go over any ground already tilled. A hundred new members in the lower branch of Congress must be appealed to in the same manner so successfully done in the sixty-second Congress. Many of these have already indicated their deep interest in our measure and some of them will be of much service with the Senators in their respective states. Our battle will be won again in the House under the leadership of Congressman Hay, supported by Congressman Deifenderfer and many others who have specially advocated its passage. As chairman of the House Military Committee, Representative Hay is thoroughly in sympathy with our aims and purposes and will no doubt secure a favorable report on the bill (No. 4541) as published in the various veterinary journals.

Three features of this bill, not a part of the bill passed by the House in the sixty-second Congress, may be referred to here as most desirable to secure.

1. The rank of captain, which was conceded as deserved and earned by the higher officers of the present army service.

2. The restoration of the section providing for retirement of those in the Quartermaster's Department, so entitled under the usual army regulations.

3. That credit will be given in examinations for advancement to those who have been in the service for more than twenty years.

These modifications I believe will be acceptable to the House Military Committee, to many of the officials of the War Department and wholly desired by the army veterinarians.

The many changes in the Senate makes it again the battleground where our most earnest efforts must be concentrated. Already the plans of your Committee, well matured, have been suddenly changed by the death of Senator Johnston, of Alabama, Chairman of the Senate Military Committee. The profession of Alabama had already done splendid work in gaining the friendly interest of Senator Johnston. Senator Johnston was a great power in the Senate Military Committee and his influence strong and vigorous among his fellow-members.

At this writing a successor as chairman has not been chosen, though the likelihood is that Senator Chamberlain, of Oregon, will be selected. This of course will swing the battle to the Pacific coast states and our western members will be put to a more earnest battle than ever before.

I shall not, in conclusion, attempt to point out individually any particular members or groups of the profession who have so earnestly and constantly given the most helpful support to the committee, but I would be forgetful indeed did I not record here that no committee of which I have knowledge of during a period of thirty years ever had so loyal, so general and generous support from the profession as a whole as your committee have had in every state and possession of the Union.

As chairman of the committee I wish to point in conclusion to one phase of the failure of popular government that every citizen of our fair land should be awake to and which calls for personal duty, that does not cease now by the election of United States Senators by popular vote. It is a fact that a sub-committee, yes, one man of a Senate committee, may deny relief to the people, even though the people's representatives speak unanimously in behalf of a measure. Let me be more specific: Senator Bristow, a member, chairman of the sub-committee of the Senate

Military Committee, by his defiant action in refusing to call the sub-committee together for action, by which a vote could have been taken, set at defiance the expressed will of the people to correct this great wrong to our profession. No man is greater than his country and no man greater than the cause you and I represent. We were entitled to a report from that sub-committee and no people's representative was justified in denying the same. An adverse report by the sub-committee would have afforded us an opportunity of testing the attitude of the Senate Military Committee as a whole, more than a majority of whom had expressed themselves as favorable to the bill and I believe would have approved the House bill. This subterfuge, by which we were denied a hearing by the Senate in behalf of our measure, presents such a menace to popular government that it behooves every man interested in good government to protest actively against such a condition. Popular elections of our Senators has not come too soon. The recall of all such officials recreant to their trust will as surely follow when once the people learn of the arbitrary power that can be exercised by one man.

Let me in conclusion express to you Mr. President my great appreciation of your ever ready coöperation and cordial assistance.

PRESIDENT MOHLER: Gentlemen, you have heard the report of the Committee on Legislation. What action do you wish taken?

DR. LYMAN: I move the report be received. (Motion seconded and carried.)

PRESIDENT MOHLER: The next number on the program is the report of the Committee on Publication. Dr. Lyman will present the report.

REPORT OF THE COMMITTEE ON PUBLICATION

BY R. P. LYMAN, Chairman
R. W. ELLIS J. H. BLATTENBERG
C. J. MARSHALL WARD GILTNER

Your committee begs leave to submit the following report on the work for the past twelve months:

Immediately following the organization of the committee appointed by President Mohler we undertook to fulfil our duties for the fiscal year with the result that there has been published under our auspices the annual report of the 1912 meeting, this in the form of the forty-ninth annual report; also an appendix to the latter, a forty-five-page report of the Proceedings of the Association of College Faculties and Examining Boards of North America.

The following letter was drafted and mailed to several publishing houses with invitation for bids for printing the Proceedings of the Indianapolis Convention:

GENTLEMEN:

You are invited to submit a bid for printing, binding, wrapping, addressing and mailing of the report of the forty-ninth annual meeting of the American Veterinary Medical Association, held in Indianapolis, Ind., August 26–31, 1912.

Bids are to be based on the following conditions:

1. The Publication Committee will deliver to the successful bidder the report, properly arranged and typewritten.

2. The contractor shall print true to copy, without submitting proof to authors for correction, except by special request of the chairman of this committee. In special cases of tabular or otherwise intricate matter proof may be sent to the author, who shall then be allowed two days for correction in addition to the time consumed in transit.

3. The material and workmanship shall conform to or equal at least, the report of 1911, except that the character of paper though similar in grade, shall be reduced in weight to a forty-five or fifty pound quality. A copy of the report above referred to is submitted as a part of these negotiations.

4. The contractor shall print, bind, sprinkle edges, furnish printed wrappers, wrap, legibly address and mail (express in certain instances only) the same according to a mailing list to be submitted by this committee; he shall thereafter deliver any remaining copies, similarly wrapped, to the librarian of the Association (Dr. S. H. Burnett, Ithaca, N. Y.) within sixty days after the typewritten copy has been delivered to the successful bidder.

5. The estimated size of the volume to be 800 pages with a type page of 24 x 43 picas, and bids are to be based upon an estimate of 1700 copies, with rates for each page more or less, for machine and hand alterations from copy per hour and for an extra 100 copies at the option of the Committee. You are also requested to quote figures for each insert on enamel book paper at least similar in quality to that found in the report submitted, we to furnish the photographs and you to arrange for the manufacture of the half-tone cuts or zinc etching.

6. The estimate to include one insert upon 100-pound enamel book paper similar to frontispiece in sample submitted.

7. The estimate, also, to include charges for tabular matter as it may occur throughout the book and similar to that observed on pages 191 and 210.

8. Bids to be submitted for the entire work to be delivered within sixty (60) days as per paragraph four (4), and bids to be addressed to the undersigned as early as practicable.

Yours very truly,
Chairman.

The work was awarded the Robert Smith Printing Company, Lansing, Michigan, through your Committee having accepted their bid as embodied in the following letter:

DEAR SIR:

As per your request of the 24th, we are pleased to submit to you the following prices on your forty-ninth Annual Convention Report:

Number of copies, 1700.
Number of pages, 800 and plain end sheets.
Type page, 24 x 43 picas.
Composition, to be similar in every respect to the sample copy submitted.
Stock, 25 x 38, 50-pound Machine Finish No. 1.
Trim size, 6 x 9⅛.
Binding, to be cased in book, with sprinkled edges, and bound similar to the sample copy.
Price, net, $1912.00, or $2.39 per page.

For the above price we have figured to have a printed wrapper around the book, same to be sealed, and the book to be tied and wrapped in corrugated board, preserving the book thoroughly for shipping purposes.

All alterations made from original copy will be charged for at the rate of $1.30 per hour for linotype corrections, and $1.20 per hour for hand work.

For printing and binding of each single page tip, the same to be printed on 25 x 38, 100-pound Enamel Book No. 1, the price will be $9.00.

For each additional page over 800, the price will be $2.39 per page.

For an additional 100 copies, the price will be $50.75.

No extra charge for tabulated matter providing there is no more than in the last edition, and should there be, a charge of $2.25 per page will be rendered.

We will agree to make zinc etchings for you for 7 cents—you to furnish the drawings or photographs for the same.

We will also agree to furnish half-tone cuts to you, of a suitable screen, at 20 cents per square inch—you to furnish photographs that will give good results. This price does not include any retouching on photographs, should your photograph be imperfect, and is for square cuts.

We have prepared a dummy showing the bulk of book, which you may see any time you call at the office.

Thanking you very kindly for your inquiry, and sincerely hoping to be favored with your order, which will have our usual prompt attention, we remain,

Yours very truly,
ROBERT SMITH PRINTING CO.

Those privileged to attend the last convention will recollect that Mr. C. F. Roberts continued to serve as our official stenographer. The division of the convention into three sections necessitated the employment of a corps of stenographers; and, though some difficulty was experienced in our endeavor to secure an exact report of the transactions of each sectional meeting, owing to the technical nature of some of the discussions and lack of familiarity upon the part of some of the stenographers of the character of the material they had to deal with, the work, was on the whole, especially satisfactory, submitted from stenographer Roberts within the prescribed time and at the saving of $100 in comparison with the year immediately preceding.

The total disbursements made under the directions of your committee during the past twelve months are summarized as follows:

December, 1912, Mr. C. F. Roberts, pèr contract	$210.77
March, 1913, Chairman, Publication Committee, incidentals and salary	341.67
March, 1913, postage for mailing reports	373.12
March, 1913, Robert Smith Printing Co., bill approved	1938.28
Total	$2863.84

It is gratifying to observe that the 1700 copies of the forty-ninth Annual Proceedings were manufactured and issued at an actual cost of $2863.84 as compared with an expense of $3490.10 in 1912, or a saving of $626.26. Several factors were influential in this regard, *i. e.*, a saving of stenographic work of $100, already alluded to; a great reduction in a number of half-tone reproductions; a substantial saving in cost of mailing the Reports as a result of the diminished size of the volume amounting to $73.59, a saving that was not accomplished at the expense of the value or appearance of the volume; indeed, your Chairman feels that it can be honestly stated that the report last issued is fully equal in attractiveness to any predecessor and that it has a compilation of papers and discussions exceeding the worth of any earlier issue. The cost per volume approximated at $1.62 as against $2.00 in 1912, and this in the face of the fact that there was an increased expenditure incidental to sending discussions to participants; this, with one exception, was accomplished with gratifying promptness, and this unquestionably adds to the value of the report.

The appended letter was enclosed with the material mailed to each speaker:

DEAR SIR:

Enclosed you will please find some pages of the elongated report submitted by stenographer Roberts. Kindly look them over with as much dispatch as is possible and correct them as you would wish them published in the Proceedings of the Annual Report should the remarks be used.

The regulation for this work is that a party debating upon a given subject or paper be allowed two days for correction or revision of remarks, exclusive of time consumed in transit from and to the Chairman.

Kindly use every endeavor to comply with the above and oblige

Yours truly,

Chairman.

On the whole little change was made in the general make-up of the report as compared with the issue to 1911. The weight of the paper was reduced from a sixty to fifty pound machine finish, thus lessening both the heft and size of the volume; half-tone cuts were grouped; in the general arrangement the individual contributions to the report of the Committee on Intelligence and Education, also Committee on Diseases were placed among papers and discussions; the minutes are divided into sessions and the newly elected members are grouped instead of being scattered throughout the several meetings of the Executive Committee.

Your committee wishes to express grateful acknowledgement of the loan of the half-tone plate of officers of the Association, the property of the *American Veterinary Review* and which was used to print the frontispiece of the recently published report.

In this report submitted by your committee a year ago it was suggested that the office of Secretary of the Association and chairman of the Publication Committee be amalgamated as a means toward better conserving the purpose and interest of the Association. Your chairman is still of the opinion that this is a worthy idea and trusts that time may be found to give the thought such consideration as it appears to deserve.

In the report for 1905 your chairman, the present incumbent of the office recommended a wider distribution of the *Proceedings*.

This subject has been again revived during the past year both by President Mohler and Librarian Burnett; the latter suggested the creation of a mailing list consisting of parties outside of the membership of the Association. It has for years seemed to your chairman that copies of our annual publications should receive a wider distribution and become available in places where they may be consulted by those engaged in research work or other varieties of medical work; in public and scientific libraries, research laboratories and elsewhere. The expense incident to publishing extra copies for this purpose would be only slight, the advertisement excellent and we believe should be considered, but thus far its accomplishments through the Publication Committee, at least, has not been possible because it has no authority to compile or use a mailing list other than that furnished by the Secretary and made up of active and honorary members.

The following letter was addressed to Mr. C. F. Roberts inviting him to continue to act as official stenographer for the Fiftieth Anniversary Meeting:

DEAR SIR:

You are invited to submit an estimate for doing the stenographic and typewritten work incident to reporting the fiftieth annual convention of the American Veterinary Medical Association, to be held at New York, Hotel Astor, during the week of September 1 next.

The work of the convention will be apportioned approximately as follows, and you are informed that the discussions of the subdivisions or sectional meetings will be considerably technical: On Monday morning and evening, Tuesday morning, Wednesday morning and evening, Thursday and Friday afternoon there are scheduled general sessions requiring the services of one stenographer. Monday afternoon, Tuesday afternoon, Wednesday afternoon and Thursday forenoon, four sections will be in session simultaneously, requiring during such periods the services of four stenographers. On Friday forenoon three simultaneous sessions, thus calling for services of three stenographers. Sessions will probably open at 9.30 A.M., 1.30 and 8 P.M., and, while the general sessions are in the nature of business meetings, the special sessions are severally divided into presentation of papers upon surgery, medicine, sanitary science and police and fourthly education. Furthermore, prior to the opening of the convention and at intervals during convention week, there will be held meetings of the Executive Committee at which attendance of a stenographer will be required, but not during the convening of the sectional meetings.

Bids to be submitted upon following basis.

First: Per diem charge for attending the convention.

Second: Per diem (or portion thereof) charges for such assistants (3) as may be necessary incident to reporting all features of the convention as may be required by the committee in charge.

Third: Price per folio (100 words) for transcribing such parts of the stenographic notes as may be required (original and one carbon copy), roughly estimated at about 350 pages of 250 words each.

Fourth: That the two copies of the elongated report be delivered, one to the Secretary (original) and the other to the chairman of the convention. This refers likewise, if required, to transcript of the proceedings of the Executive Committee.

Fifth: That Publication Committee reserves the right to strike out any part of the stenographic report prior to typewriting.

Sixth: That discussions of technical character as delivered by an individual shall begin and end on a separate page (whenever of material volume), thus to facilitate sending copy to author for suitable revision.

Seventh: That terms will be cash upon delivery of work in good order and upon approval of the account by the President and Secretary of the Association.

Very truly yours,

Chairman.

The Committee decided to accept his quotations as embodied in the following letter:

My Dear Doctor:

I am just in receipt of yours of the 4th inst. with reference to reporting the meeting of the A. V. M. A. to meet in New York the first week in September.

As you know, I am largely out of the reporting line, but inasmuch as this will be the golden jubilee of the Association I think it will be a good time for both of us to retire, and realizing, as I do, how difficult it will be to train a new man in at short notice on this big job, and in view of your request I will stay on the job.

I will do the work on the same basis as last year, namely $10 for each day as an attendance fee, and 15 cents per folio for two copies of the proceedings of the Association and of the executive committee, you to reserve the right to have all or only a portion of the executive committee proceedings extended or transcribed.

Owing to the fact that I shall be in court a good deal the latter part of September I wish it could be arranged to give me until October 15 in which to finish the job. There is always more or less delay in getting the copy together where the work is being done by a number of different people, and it sometimes happens that it has to go back for alterations or changes, all of which take time.

I will also make a charge of $15 for traveling expenses, and a charge for the actual expenses which I may be put to for such assistant reporters as are necessary.

If the Association will stand for the expenses I should very much like to get Mr. Rose, of Chicago, again. My own idea of it is he did some splendid work at Indianapolis last year. I do not know of any man in the country that we could have put on to this work which Mr. Rose was required to do and who do it so clear and so well.

If we are required to cover the meetings of the Association of College Faculties please have it definitely understood whether the fees are to be paid by that Association or by the A. V. M. A. There was a little mix-up about the matter last time, and there is a small item of four or five dollars which has never been closed up.

Very truly yours,
C. F. ROBERTS.

PRESIDENT MOHLER: Gentlemen, you have heard the report of the Committee on Publiction. What is you pleasure?

DR. HOSKINS: Mr. President, I move it be accepted. (Motion seconded and passed.)

PRESIDENT MOHLER: The next order of business is the report of the Committee on Finance. We shall be pleased to hear from the Chairman, Dr. Sigler.

REPORT OF THE COMMITTEE ON FINANCE

BY THOMAS A. SIGLER, Chairman
H. PRESTON HOSKINS A. S. COOLEY

To the Officers and Members of the American Veterinary Medical Association:

Your Committee on Finance having carefully examined and audited the books of the Secretary and the Treasurer, find the same to be correct as per card index and vouchers and the reports of these officers as submitted.

DR. HOSKINS: I move the adoption of the report. (Motion seconded and passed.)

PRESIDENT MOHLER: I would like to ask the acting chairman of the Executive Committee if he has anything to report at this time.

DR. STEWART: The work of the first two meetings of the Executive Committee has been supplied to me by the stenographer, and I will present this report.

REPORT OF THE EXECUTIVE COMMITTEE

BY A. D. MELVIN, Chairman
SESCO STEWART, Acting Chairman

JOSEPH HUGHES
F. TORRANCE
HARRY D. GILL
DAVID F. FOX
C. J. MARSHALL
GEORGE R. WHITE

JOHN R. MOHLER
G. H. ROBERTS
JOHN W. ADAMS
H. JENSEN
C. E. COTTON
V. A. MOORE

The first meeting of the Executive Committee was held at the Hotel Astor, New York City, on Saturday, August 30, at 10 A.M., Dr. S. Stewart in the chair.

The following members were present: Doctors Mohler, Marshall, Moore, White, Adams, Jensen, Stewart, Roberts, Hughes, Cotton, Torrance, Gill and Fox.

Members absent, Dr. A. D. Melvin.

On motion duly seconded and passed it was voted to recommend to the Association that the following applicants be elected to membership:

ALABAMA

BECKMAN, LOUIS EDGAR, D.V.M., Tuscaloosa, Ala. (Alabama Polytechnic Institute, 1913), Voucher, C. A. Cary. President and Secretary.

INGRAM, WILLIAM LEMUEL, D.V.M., Florence, Ala. (Alabama Polytechnic Institute, 1910). Voucher, C. A. Cary, President and Secretary.

WEBB, JAMES CLEVELAND, D.V.M., Piedmont, Ala. (Alabama Polytechnic Institute, 1911). Voucher, C. A. Cary, President and Secretary.

WEBB, W. W., D.V.M., Auburn, Ala. (Alabama Polytechnic Institute, 1911). Voucher, C. A. Cary, President and Secretary.

ARIZONA

AGNEW, ROBERT V., V.S., Fort Apache, Arizona (Ontario Veterinary College, 1895). Voucher, Victor A. Norgaard, President and Secreatry.

CALIFORNIA

ASBILL, ARCHIBALD RUFF, D.V.M., Sacramento, Cal. (San Francisco Veterinary College, 1906). Vouchers, David F. Fox and Charles Keane.

ENGEL, FRANK PHILIP, D.V.M., San Francisco, Cal. (San Francisco Veterinary College, 1913). Vouchers, David F. Fox and Edward Tow.

GULDAGER, FRED HOWARD, D.V.S., Sacramento, Cal. (San Francisco Veterinary College, 1911). Vouchers, David F. Fox and J. P. Iverson.

HENRICH, LEO OTTO, D.V.M., Vacaville, Cal. (San Francisco Veterinary College, 1913). Vouchers, David F. Fox and Charles Keane.

MISSALL, WILLIAM CHARLES, D.V.S., Santa Maria, Cal. (San Francisco Veterinary College, 1910). Vouchers, David F. Fox and Charles Keane.

REY, CHARLES R., D.V.M., Walnut Creek, Cal. (San Francisco Veterinary College, 1913). Vouchers, David F. Fox and Charles Keane.

RITTER, ROY W., M.D.V., Holtville, Cal. (McKillip Veterinary College, 1911). Vouchers, David F. Fox and Charles Keane.

WUNDLE, THOMAS THEODORE, D.V.S., Oxnard, Cal. (San Francisco Veterinary College, 1911). Vouchers, David F. Fox and Charles Keane.

UTT, JAMES GARFIELD, D.V.M., Bishop, Inyo Co., Cal. (San Francisco Veterinary College, 1912). Vouchers, David F. Fox and Charles Keane.

Wing, Charles C., D.V.S., Oakland, Cal. (San Francisco Veterinary College, 1911). Vouchers, David F. Fox and H. W. C. Lichtenwalter.

CONNECTICUT

Devereaux, John L., V.S., Waterbury, Conn. (Ontario Veterinary College, 1898). Vouchers, P. T. Keeley and Charles H. Beere.

DELAWARE

Houchin, Arthur Sydney, V.M.D., Newark, Del. (University of Pennsylvania, 1909). Vouchers, Raymond C. Reed and H. P. Eves.

GEORGIA

Handley, John Issac, D.V.M., Fitzgerald, Ga. (Alabama Polytechnic Institute, 1913). Voucher, C. A. Cary, President and Secretary.

Hudson, Percy Wilbur, D.V.M., Americus, Ga. (Alabama Polytechnic Institute, 1909). Voucher, C. A. Cary, President and Secretary.

HAWAII

Case, Leonard Newton, D.V.M., Honolulu, Ter. of Hawaii (New York State Cornell University, 1908). Vouchers, V. A. Norgaard and J. R. Mohler, President and Secretary.

Elliott, Harold B., M.R.C.V.S., Hilo, Hawaii (New York Veterinary College, Edinburgh, 1894). Voucher, Victor A. Norgaard, President and Secretary.

Katsunuma, Tomizo, Honolulu, Hawaii (Veterinary College Komaba Tokio, Japan, 1889). Voucher, Victor A. Norgaard. President and Secretary.

Shipman, Oliver B., D.V.S., Hilo, Hawaii (San Francisco Veterinary College, 1907). Voucher, Victor A. Norgaard, President and Secretary.

ILLINOIS

Schwarze, Herman R., M.D.V., Springfield, Ill. (Western Kansas City, 1903, and Chicago Veterinary College, 1907). Vouchers, L. A. Merillat and A. T. Peters.

Shaw, William Harvey, M.D.V., Pawnee, Ill. (Chicago Veterinary College, 1910). Vouchers, R. A. Luzader and L. A. Merillat.

Wells, Thomas Grover, M.D.V., Arthur, Ill. (McKillip Veterinary College, 1911). Vouchers, L. A. Merillat and George B. McKillip.

INDIANA

Albershardt, August H., V.S., Indianapolis, Ind. (Indiana Veterinary College, 1904). Vouchers, C. I. Fleming and O. L. Boor.

Buzzard, David K., D.V.S., Goshen, Ind. (Veterinary Department Detroit College of Medicine, 1894). Vouchers, W. J. Armour and A. F. Nelson.

Lordell, Stephen C., M.D.V., LaFayette, Ind. (McKillip's Veterinary College, 1910). Vouchers, R. A. Craig and G. H. Roberts.

McLeay, John Donaldson, D.V.M., Indianapolis, Ind. (Indiana Veterinary College, 1913). Vouchers, G. H. Roberts and W. B. Craig.

Shuler, C. C., D.V.M., Eaton, Ind. (Indiana Veterinary College, 1912). Vouchers, G. H. Roberts and O. L. Boor.

Thomas, Raymond F., D.V.M., Maywood, Ind. (Indiana Veterinary College, 1912). Vouchers, C. I. Fleming and O. L. Boor.

IOWA

Bergman, H. D., D.V.M., Ames, Iowa (Iowa State College, 1910). Vouchers, W. W. Dimock and C. H. Stange.

Brazie, F. E., M.D.C., Harlan, Iowa (Chicago Veterinary College, 1905). Vouchers, R. M. Bacon and J. I. Gibson.

Byerrum, Roswell O., M.D.C., Durant, Iowa (Chicago Veterinary College, 1911). Vouchers, D. H. Miller and Hal C. Simpson.

Ferrand, William Stenton, D.V.M., Gilmore City, Iowa (Iowa State College, 1912). Vouchers, John R. Mohler and C. J. Marshall.

Gibson, James Irvine, V.S., Des Moines, Iowa (Ontario Veterinary College, 1887). Vouchers, R. M. Bacon and D. H. Miller.

Hedley, Clarke, D.V.M., Cedar Rapids, Iowa (Cincinnati Veterinary College, 1907). Vouchers, Herman Greeder and J. P. Foster.

Lollar, Ernest E., D.V.M., Sioux City, Iowa (Indiana Veterinary College, 1912). Vouchers, G. H. Roberts and W. B. Craig.

LOUISIANA

Morris, Harry, D.V.M., Baton Rouge, La. (Ohio State College, 1910). Vouchers, W. H. Dalrymple and E. P. Flower.

MAINE

Jervis, Horace Berkley, F., V.S., Houlton, Maine (Ontario Veterinary College, 1904). Vouchers, A Joly and C. L. Blakely.

Murch, Alfred Littlefield, M.D.V., Bangor, Maine (Harvard University, 1892). Vouchers, A. Joly and C. L. Blakely.

Stevens, Herbert L., D.V.S., Rockland, Maine (Grand Rapids Veterinary College, 1906). Vouchers, A. Joly and C. L. Blakely.

MARYLAND

Huebschamann, John, M.D.C., Baltimore, Md. (Chicago Veterinary College, 1907). Vouchers, F. H. Mackie and H. A. Hedrick.

Lambert, Frederick William, D.V.M., New Windsor, Md. (The George Washington University, 1913). Vouchers, Joseph P. Grogan and F. H. Mackie.

MASSACHUSETTS

Paquin, Charles Henry, V.S., Barre, Mass. (Ontario Veterinary College, 1900). Vouchers, L. A. Paquin and Charles H. Perry.

MICHIGAN

Cox, Walter R., V.S., Millington, Mich. (Ontario Veterinary College, 1913). Vouchers, W. Austin Ewalt and S. Brenton.

Gerlach, G. H., V.S., Mounci, Mich. (Ontario Veterinary College, 1906). Vouchers, George W. Dunphy and G. D. Gibson.

Hawkins, Joseph, V.S., Detroit, Mich. (Ontario Veterinary College, 1871). Vouchers, S. Brenton and George W. Dunphy.

Hutton, John P., D.V.M., East Lansing, Mich. (Ohio State University, 1911). Vouchers, Richard P. Lyman and Ward Giltner.

McKercher, Arthur, V.S., Lansing, Mich. (Ontario Veterinary College, 1893). Vouchers, S. Brenton and George W. Dunphy.

Seibert, Walter D., D.V.S., Petoskey, Mich. (Detroit Veterinary College, 1896). Vouchers, S. Brenton and George W. Dunphy.

Sexmith, A. B., M.D.V., V.S., Charlotte, Mich. (Ontario Veterinary College, 1904. Chicago Veterinary College, 1906). Vouchers, G. D Gibson and W. Austin Ewalt.

Smith, Henry V., D.V.S., Detroit, Mich. (Detroit College of Medicine Veterinary Department, 1895). Vouchers, E. P. Schaffter and Z. Veldhuis.

MINNESOTA

Hansen, Hans P., D.V.M., Austin, Minn., (Chicago Veterinary College, 1913). Vouchers, M. F. Leffingwell and H. C. Lyon.

McKey, John, V.S., Duluth, Minn. (Ontario College, 1895). Vouchers, C. J. Sigmond and G. Ed. Leech.

Dinwoodie, John T. E., V.M.D., St. Paul, Minn. (University of Pennsylvania Veterinary School, 1913). Vouchers, Charles F. Flocken and H. Preston Hoskins.

MISSISSIPPI

Leigh, Beverly M., V.S., Meridian, Miss. (Ontario Veterinary College, 1906). Vouchers, E. M. Ranck, J. R. Mohler, and C. J. Marshall.

Norton, Oscar M., V.M.D., Greenville, Miss. (University of Pennsylvania Veterinary School, 1901). Vouchers, E. M. Ranck, J. R. Mohler, and C. J. Marshall.

MISSOURI

Davidson, William A., D.V.S., South St. Joseph, Mo. (Kansas City Veterinary College, 1907). Vouchers, B. W. Murphy and T. A. Shipley.

Koen, John Stratton, D.V.S., Kansas City, Mo. (Kansas City Veterinary College, 1907). Vouchers, F. F. Brown and S. Stewart.

Lash, Chris D., D.V.S., Rosendale, Mo. (Kansas City Veterinary College, 1910). Vouchers, F. F. Brown and S. Stewart.

Walsh, S. S. N., D.V.M., St. Louis, Mo. (Kansas City Veterinary College, 1913). Vouchers, F. F. Brown and S. Stewart.

MONTANA

Johnson, Oscar Joseph, D.V.M., Helena, Mont. (Ohio State University, 1911). Vouchers, F. S. Gray and A. D. Knowles.

Orr, William Crosby, V.S., Dillon, Mont. (Ontario Veterinary College, 1894). Vouchers, Walter J. Taylor and A. D. Knowles.

NEBRASKA

Weinman, Joseph Ephrim, D.V.M., Loup City, Neb. (Kansas City Veterinary College, 1913). Vouchers, F. F. Brown and S. Stewart.

NEVADA

Yancey, William E., D.V.M., Carson City, Nevada (San Francisco Veterinary College, 1913). Vouchers, David F. Fox and Charles Keane.

NEW JERSEY

Blair, Bruce, V.M.D., Jersey City, N. J. (University of Pennsylvania, 1909). Vouchers, Thomas E. Smith and George W. Smith.

Glennon, Henry J., M.D.C., Newark, N. J. (Chicago Veterinary College, 1905). Vouchers, James T. Glennon and Thomas E. Smith.

Steinbach, Frederick Gustav, V.M.D., Wildwood, N. J. (Veterinary Department of University of Pennsylvania, 1912). Vouchers, John W. Adams and C. J. Marshall.

Weber, Henry Stanley, M.D.V.,, Weehawken, N. J. (McKillip Veterinary College, 1908). Vouchers, Thomas E. Smith and George W. Smith.

Winter, Howard E., V.M.D., Plainfield, N. J. (University of Pennsylvania, 1910). Vouchers, L. J. Beloff and J. Payne Lowe.

NEW YORK

Anderson, George Guild, V.S., New York City (Ontario Veterinary College, 1913). Vouchers, J. Elliott Crawford and Frank M. Miller.

Breed, Frank, D.V.M., Pearl River, N. Y. (N. Y. State Veterinary College, 1911). Vouchers, S. H. Burnett and F. S. Jones.

Burley, Arthur James, D.V.M., Buffalo, N. Y., (N. Y. State Veterinary College, 1905). Vouchers, Bernard P. Wende and Chester R. Perkins.

Danforth, Arthur Louis, D.V.M., Goshen, N. Y. (N. Y. State Veterinary College, 1911). Vouchers, J. F. DeVine and P. A. Fish.

Frost, James N., D.V.M., Ithaca, N. Y. (N. Y. State Veterinary College, 1907). Vouchers, W. L. Williams and V. A. Moore.

Gannett, Ray Willard, D.V.M., Brooklyn, N. Y. (N. Y. State Veterinary College, 1905). Vouchers, George H. Berns and Elisha Hanshew.

Gardner, Chennie A., V.S., Morris, N. Y., (Ontario Veterinary College, 1908). Vouchers, H. R. Ryder and C. H. Taylor.

Gillespie, John F., D.V.S., Brooklyn, N. Y. (N. Y. State Veterinary College, 1904). Vouchers, Elisha Hanshew and George H. Berns.

Holford, Fred DeWitt, D.V.M., Albany, N. Y., (N. Y. State Veterinary College, 1902). Vouchers, J. F. DeVine and J. G. Wills.

Jenks, Ralph Collyer, D.V.S., Ossining, N. Y. (American Veterinary College, 1897). Vouchers, F. W. Andrews and J. F. DeVine.

McKim, Orville Ernest, V.S., New York City (Ontario Veterinary College, 1908). Vouchers, W. H. Coates and Robert W. McCulley.

Marshall, Charles William, D.V.M., Brewster, N. Y. (N. Y. State Veterinary College, 1908). Vouchers, F. W. Andrews and George A. Knapp.

Martin, Harry D., V.S., Buffalo, N. Y. (Ontario Veterinary College 1893). Vouchers, P. A. Fish and Edward Rafter.

Maxson, Wilbur Bernett, D.V.S., New York City (New York American Veterinary College, 1911). Vouchers, Robert W. Ellis and C. E. Clayton.

Miller, Harry Kaser, V.S., Mamaroneck, N. Y. (N. Y. College of Veterinary Surgeons, 1891). Vouchers, Harry D. Gill and J. F. DeVine.

Phyfe, Walter H., D.V.S., Middletown, N, Y. (American Veterinary College, 1909). Vouchers, George H. Berns and Clarence E. Shaw.

Risley, Harry B., D.V.M., Brooklyn, N. Y. (N. Y. State Veterinary College, 1909). Vouchers, George H. Berns and Clarence E. Shaw.

Russell, Fay Franklin, V.S., B.V. Sc., Jamestown, N. Y. (Ontario Veterinary College, 1913). Vouchers, Frank Hunt and Wm. Henry Kelly.

Smith, Wright J., D.V.S., Kingston, N. Y. (American Veterinary College, 1895). Vouchers, John McCartney and J. F. DeVine.

Tompkins, Leland James, D.V.M., Ohenta, N. Y. (N. Y. State Veterinary College, 1912). Vouchers, J. F. DeVine and V. A. Moore.

Udall, D. H., B.S.A., D.V.M., Ithaca, N. Y. (N. Y. State Veterinary College, 1901). Vouchers, W. L. Williams and H. J. Milks.

Webber, Carr R., Rochester, N. Y. (Chicago Veterinary College, 1902). Vouchers, George H. Berns and W. G. Hollingworth.

Wende, Horatio S., V.S., Tonawanda, N. Y. (Ontario Veterinary College, 1886). Vouchers, David W. Cochran and George H. Berns.

NORTH DAKOTA

Craig, Thomas Frederick, V.S., Hampden, N. Dakota (Ontario Veterinary College, 1906). Vouchers, W. F. Crewe and C. H. Babcock.

Fuller, Claude Eugene, M.D.C., Beach, N. Dak. (Chicago Veterinary College, 1908). Vouchers, W. F. Crewe and C. H. Babcock.

Grady, William F., M.D.V., Lankin, N. Dak. (Ontario Veterinary College, 1896). Vouchers, W. F. Crewe and C. H. Babcock.

Jackson, Crawford Charles, D.V.M., Dickinson, N. Dak. (Terre Haute Veterinary College, 1912). Vouchers, W. F. Crewe and C. H. Babcock.

Kenney, Thomas G., V.S., Bismarck, N. Dak. (Ontario Veterinary College, 1908). Vouchers, W. F. Crewe and C. H. Babcock.

Kreuziger, Martin W., M.D.V., Bowman, N. Dak. (McKillip's Veterinary College, 1910). Vouchers, W. F. Crewe and C. H. Babcock.

Pugh, Walter Maurice, V.S., Milnor, N. Dak. (Ontario Veterinary College, 1905). Vouchers, W. F. Crewe and C. H. Babcock.

Sutter, Errold. M.D.C., Beach, N. Dak. (Chicago Veterinary College, 1904). Vouchers, W. F. Crewe and C. H. Babcock.

Osborn, Orin H., D.V.M., Velva, N. Dak. (McKillip Veterinary College, 1912). Vouchers, W. F. Crewe and C. H. Babcock.

O'Toole, Stephen, D.V.M., Agricultural College, N. Dak. (Ohio State University, 1908). Vouchers, L. Van Es and W. F. Crewe.

Winslow, Joseph H., D.V.M., Lamoure, N. Dak. (Indiana Veterinary College, 1912). Vouchers, W. F. Crewe and C. H. Babcock.

OHIO

Barnett, Frank E., V.S., Painesville, O. (Ontario Veterinary College, 1889). Vouchers, J. D. Fair, President and Secretary.

Lapple, Edward, D.V.M., Cincinnati, O. (Cincinnati Veterinary College, 1911). Vouchers, J. D. Fair and Louis P. Cook.

Pinkross, Rolf D., D.V.M., Camp Dennison, O. (Cincinnati Veterinary College, 1910). Vouchers, J. D. Fair and Louis P. Cook.

Planz, John Frank, D.V.M., Akron, O. (Ohio State University, 1904). Vouchers, A. S. Cooley and Paul Fischer.

Timmons, Wilfred H., D.V.M., Cincinnati, O. (Cincinnati Veterinary College, 1909). Vouchers, E. L. Bertram and Frank R. Butz.

OREGON

Heuneberger, W. B., V.M.D., Portland, Ore. (University of Pennsylvania, 1906). Vouchers, Howard H. Custis and W. Dean Wright.

Olson, Luther E., D.V.S., Portland. Ore., (Kansas City Veterinary College, 1911). Vouchers, W. Dean Wright and H. Silverwood.

PENNSYLVANIA

Balthaser, Harry Becker, V.M.D., Philadelphia, Pa. (University of Pennsylvania, 1913). Vouchers, W. J. Crocker and C. J. Marshall.

Bender, Harry Ellsworth, V.M.D., Lititz, Pa. (University of Pennsylvania, 1901). Vouchers, E. W. Newcomer and F. H. Schneider.

Boerner, Frederick, Jr., V.M.D., Philadelphia, Pa. (University of Pennsylvania, 1912). Vouchers, K. F. Meyer and C. J. Marshall.

Broude, Harry Frank, V.M.D., Harrisburg, Pa. (University of Pennsylvania, 1913). Vouchers, T. E. Munce and C. J. Marshall.

Cleveland, Edgar Charles, Jr., V.M.D., Philadelphia, Pa. (University of Pennsylvania, 1913). Vouchers, Frank E. Lentz and C. J. Marshall.

Corn, Samuel, V.M.D., Philadelphia, Pa. (University of Pennsylvania, 1913). Vouchers, John W. Adams and C. J. Marshall.

Elkin, Joseph Homer, D.V.M., Smicksburg, Pa. (Grand Rapids Veterinary College, 1907). Vouchers, Albert F. Elkin and F. H. Schneider.

Feist, Arnold Andrew, V.M.D., Philadelphia, Pa. (University of Pennsylvania, Veterinary Department, 1912). Vouchers, C. J. Marshall and John W. Adams.

Hardenbergh, James Ball, V.M.D., Philadelphia, Pa. (University of Pennsylvania, 1911). Vouchers, K. F. Meyer and C. J. Marshall.

Harkins, Malcom J., V.M.D., Conshohocken, Pa. (University of Pennsylvania, 1912). Vouchers, John Reichel and Edward Records.

Herbott, Julius W., V.M.D., Philadelphia, Pa. (University of Pennsylvania, 1912). Vouchers, Edward E. Behrens and F. H. Schneider.

Herron, Moore Bryant, V.D.M., Venetia, Pa., (University of Pennsylvania, 1912). Vouchers, C. J. Marshall and F. H. Schneider.

Hickman, D. Elwyn, V.M.D., West Chester, Pa. (University of Pennsylvania, 1904). Vouchers, Carl W. Gay and C. J. Marshall.

Koehler, Edward F., D.V.S., Easton, Pa. (American Veterinary College, N. Y., 1890). Vouchers, C. J. Marshall and F. H. Schneider.

Linberg, John William, V.M.D., Philadelphia, Pa. (University of Pennsylvania, 1912). Vouchers, B. F. Senseman and F. H. Schneider.

McGroarty, Bernard, V.M.D., Boothwyn, Pa. (University of Pennsylvania Veterinary School, 1912). Vouchers, Philip K. Jones and Samuel E. Bruner.

Michener, Hiram M., V.M.D., Philadelphia, Pa. (University of Pennsylvania, 1912). Vouchers, C. J. Marshall and F. H. Schneider.

Mitchell, Harry Bartle, V.M.D., Wellsboro, Pa. (University of Pennsylvania Veterinary School, 1912). Vouchers, R. M. Staley and C. J. Marshall.

Mitterling, Ira, V.M.D., Philadelphia, Pa., (University of Pennsylvania, 1912). Vouchers, Daniel S. Miller and C. J. Marshall.

Mumma, Edward Woodyear, V.M.D., Glenolden, Pa. (University of Pennsylvania, 1912). Vouchers, John Reichel and Edward Records.

Neuhaus, Charles Owen, V.M.D., Glen Rock, Pa. (University of Pennsylvania, 1912). Vouchers, C. J. Marshall and F. H. Schneider.

Palmer Clinton Budd, M.D.C., Easton, Pa. (Chicago Veterinary College, 1911). Vouchers, C. J. Marshall and F. H. Schneider.

Quigley, Roscoe Murphy, V.M.D., Tyrone, Pa. (University of Pennsylvania, 1912). Vouchers, W. Horace Hoskins and Cheston M. Hoskins.

Strickler, C. M., V.S., Greencastle, Pa. (Ontario Veterinary College, 1890). Vouchers, J. P. Stover and F. H. Schneider.

Stubbs, Evan Lee, V.M.D., Oxford, Pa. (Department of Veterinary Medicine, University of Pennsylvania, 1911). Vouchers, Louis A. Klein and C. J. Marshall.

Werntz, Harvey Grant, V.M.D., Pittsburgh, Pa. (University of Pennsylvania, 1912). Vouchers, C. J. Marshall and F. H. Schneider.

Wolcott, Leroy B., D.V.M., Glenolden, Pa. (Kansas State Agricultural College, 1912). Vouchers, Edward Records and John Reichel.

Patrick, Murray E., V.M.D., Greenburg, Pa. (Veterinary School University of Pennsylvania, 1912). Vouchers, S. E. Bruner and H. W. Turner.

PHILLIPPINE ISLANDS

Bell, John Benson, D.V.M., Manila, P. I. (N. Y. State Veterinary College, 1909). Vouchers, Donald B. Palmer and A. R. Ward.

Boynton, William H., D.V.M., Alabang, Rizal Prov., P. I. (N. Y. State Veterinary College, 1908). Vouchers, A. R. Ward and Stanton Youngberg.

Buencamino, Victor, D.V.M., Manila, P. I. (N. Y. State Veterinary College, 1911). Vouchers, Donald B. Palmer and A. R. Ward.

Edwards, Frank, D.V.S., Manila, P. I. (Kansas City Veterinary College, 1909). Vouchers, J. R. Burns and A. R. Ward.

Shand, James Reid, M.D.C., Fort Wm. McKinley, Rizal, P. I. (Chicago Veterinary College, 1907). Vouchers, J. R. Jefferis and H. F. Steele.

SOUTH CAROLINA

McInnes, Benjamin Kater, V.M.D., Charleston, South Carolina (University of Pennsylvania, 1911). Vouchers, Benjamin McInnes, J. R. Mohler, and C. J. Marshall.

Morse, John H., V.M.D., Sumter, South Carolina (University of Pennsylvania, 1904). Voucher, Benjamin McInnes, J. R. Mohler, and C. J. Marshall.

Powers, Maurice Ray, D.V.S., Clemson College, South Carolina, (N. Y. American Veterinary College, 1906). Vouchers, Benjamin McInnes and Louis Freidheim.

SOUTH DAKOTA

Burns, George H., D.V.M., Sioux Falls, South Dakota (Cincinnati Veterinary College, 1910). Vouchers, Louis P. Cook and Chester Miller.

TEXAS.

Johnson, Levi E., V.M.D., San Antonio, Texas (University of Pennsylvania, Veterinary Department, 1896). Vouchers, J. R. Mohler and C. J. Marshall.

Pearce, Dee, M.V.D., Celeste, Texas (McKillip Veterinary College, 1908). Vouchers, R. P. Marsteller and M. Francis.

Schmidt, Hubert, D.V.M., College Station, Texas (Royal Veterinary School, Berlin Germany, 1912). Vouchers, R. P. Marsteller and M. Francis.

VERMONT

Bancroft, Ernest H., M.D.C., Barre, Vt. (Chicago Veterinary College, 1911). Vouchers, Guy N. Welch and F. A. Rich.

Barr, Oresta Edward, V.S., Barre, Vt. (Ontario Veterinary College, 1908). Vouchers, Robert Weir amd F. A. Rich.

Mills, H. Lee, D.V.M., Burlington, Vt. (Grand Rapids, Veterinary College, 1911). Vouchers, Robert Weir and F. A Rich.

Morin, C. L., D.V.S., St. Albans, Vt. (McGill University, 1884). Vouchers, F. A. Rich and Robert Weir.

Parker, John Clarke, D.V.S., St. Albans, Vt. (McGill University Veterinary Department, 1897). Vouchers, F. A. Rich and Robert Weir.

Stephens, George, D.V.S., White River Junction, Vt. (American Veterinary College, 1879). Vouchers, F. A. Rich and Robert Weir.

Stetson, Henry C., V.S., St. Johnsburg, Vt. (Ontario Veterinary College, 1911). Vouchers, F. A. Rich and Robert Weir.

Stevenson, George Trelford, D.V.S., Burlington, Vt. (McGill Veterinary College, 1897). Vouchers, C. D. McMurdo and G. H. Koon.

Whitney, John Gregory, D.V.S., Montpelier, Vt. (Grand Rapids Veterinary College, 1906). Vouchers, F. A. Rich and Robert Weir.

VIRGINIA

Willis, Harry S., V.S., Rapidan, Va. (N. Y. College Veterinary Surgeons, 1892). Vouchers, George C. Faville and R. R. Clark.

WASHINGTON

Fullington, Harry C., M.D.C., Seattle, Wash. (Chicago Veterinary College, 1910). Vouchers, Edward J. Drake and J. T. Seely.

Jones, George Andrew, D.V.M., Sedro Wooley, Wash. (Kansas City Veterinary College, 1912). Vouchers, C. S. Philips and E. V. Edwards, President and Secretary.

Smith, Fletcher Eugene, D.V.M., Seattle, Wash. (N. Y. State Veterinary College, 1905). Vouchers, Thomas O. Anders, and E. D. Kennedy.

Wegner, Earl Edward, D.V.S., Pullman (Washington State College Veterinary Department, 1908). Vouchers, S. B. Nelson and J. T. Seely.

WEST VIRGINIA

Hardman, Russell T., D.V.M., Kyger, W. Va. (Cincinnati Veterinary College, 1913). Vouchers, Louis P. Cook and Frank R. Butz, President and Secretary.

Leuder, Charles Augustus, D.V.M., Morgantown, W. Va. (N. Y. State Veterinary College, 1902). Vouchers, L. N. Reefer and V. A. Moore, President and Secretary.

WISCONSIN

Abbott, Andrew J., V.S., Marshfield, Wis. (Ontario Veterinary College, 1907). Vouchers, W. G. Clark and W. A. Wolcott.

Beckwith, Joseph W., M.D.C., Shullsburg, Wis. (Chicago Veterinary College, 1902). Vouchers, L. A. Wright and W. G. Clark (Reinstatement).

WYOMING

Bond, James Ralston, D.V.M., Wheatland, Wyoming (Kansas City Veterinary College, 1912). Vouchers, B. F. Davis and S. Stewart.

ALBERTA, CANADA

Johnson, Nerls A., V.S., Wetaskiwin, Alta. (Ontario Veterinary College, 1908). Vouchers, J. C. Hargrave and C. H. H. Sweetapple.

BRITISH COLUMBIA, CANADA

Ransom, Shearman, V.S., Vancouver, B. C. (Ontario Veterinary College, 1902). Vouchers, J. Williamson Frank and S. F. Tolmie.

Swenerton, L. Daniel, V.S., Vancouver, B. C. (Ontario Veterinary College, 1902). Vouchers, H. A. Brown and S. F. Tolmie.

MANITOBA, CANADA

Jones, Frederick C., V.S., Winnipeg, Man. (Ontario Veterinary College, 1899). Vouchers, C. D. McGilvray and Will A. Hilliard.

McCaskill, Alexander Whitney, V.S., Clear Springs, Man. (Ontario Veterinary College, 1913). Vouchers, C. D. McGilvray and William Hilton.

Martin, Stanley Thomas, B.V.S., Winnipeg, Man. (Ontario Veterinary College, 1906). Vouchers, F. Torrance and W. Hilton.

Shonyo, John Howard, V.S., Winnipeg, Man. (Ontario Veterinary College, 1908). Vouchers, C. D. McGilvray and Will A. Hilliard.

Skinner, John Frederick, V.S., Morris, Man. (Ontario Veterinary College, 1913). Vouchers, C. D. McGilvray and W. A. Hilliard.

NOVA SCOTIA, CANADA

McFetridge, Howard Simons, V.S., Halifax, N. S. (Ontario Veterinary College, 1898). Vouchers, George Hilton and W. H. Pethick.

Townsend, George, D.V.S., New Glasgow, N. S. (McGill Veterinary College, 1891). Vouchers, Wm. Jakeman and Adam T. McLean.

ONTARIO, CANADA

Hall, Orlan, V.S., B.V.S., Ottawa, Ont. (Ontario Veterinary College, 1910). Vouchers, A. E. Moore and George Hilton.

Ross, H. H., V.S., Ottawa, Ont. (Ontario Veterinary College, 1905). Vouchers, F. Torrance and George Hilton.

QUEBEC, CANADA

Brazenall, Thomas, D.V.M., Bury, Quebec (Grand Rapids Veterinary College, 1913). Vouchers, H. I. Schuh and John M. Miller.

DuJardin, Guillaume, D.V.S., Montreal, Canada (Laval University Veterinary Department, 1905). Vouchers, O. Laroche and A. A. Etienne.

Hood, Archibald John, M.D.V., Montreal, Canada (Laval University, Veterinary Department, 1906). A. A. Etienne and O. Laroche.

SASKATCHEWAN, CANADA

Baker, Mark, V.S., Regina, Sask. (Ontario Veterinary College, 1907). Vouchers, D. S. Tamblyn and T. B. Harries.

Cameron, Alne Edward, V.S., Regina, Sask. (Ontario Veterinary College, 1908). Vouchers, John F. Burnett and D. S. Tamblyn.

King, John, V.S., Carlisle, Sask. (Ontario Veterinary College, 1887). Vouchers, J. J. Murison and D. S. Tamblyn.

McClellan, Milton Porter, V.S., Grenfell, Sask. (Ontario Veterinary College, 1900). Vouchers, F. Torrance and John F. Burnett.

Preston, Marvin James, V.S.B.V.S., Moosomin, Sask. (Ontario Veterinary College, 1911). Vouchers, F. Torrance and W. Hilton.

Reid, William, V.S., Balcarres, Sask. (Ontario Veterinary College, 1906). Vouchers, D. S. Tamblyn and John F. Burnett.

Wright, Norman, V.S., Saskatoon, Sask. (Ontario Veterinary College, 1907). Vouchers, D. S. Tamblyn and John F. Burnett.

On motion duly seconded and passed it was voted to recommend to the Association the following applications for membership received too late to be printed with the list contained in the program be received, and the candidates elected to membership:

Backer, Frederick Arnold, Toledo, O. (Ontario Veterinary College, 1913). Vouchers, Reuben Hilty and F. E. Anderson.

Bateman, John F., Berkeley, Cal. (San Francisco Veterinary College, 1908). Vouchers, David F. Fox, C. J. Marshall and J. R. Mohler.

Birch, Raymond Russell, Ithaca, N. Y. (N. Y. State Veterinary College, 1912). Vouchers, P. A. Fish and H. J. Milks.

Buck, John M., Washington, D. C. (Ohio State University, 1907). Vouchers, Adolph Eichhorn and Jacob Traum.

Davison, Elwin T., Athenia, N. J. (Iowa State College, 1895). Vouchers, R. W. Hickman, John R. Mohler.

Doyle, Simon A., San Francisco, Cal. (San Francisco, 1913). Vouchers, David F. Fox and Charles Keane.

Denison, Kinsman William, Benridji, Minn. (Chicago Veterinary College, 1912). Vouchers, S. H. Ward and H. C. Lyon.

Dougherty, T. E., Danville, Ind. (Ontario, 1908). Vouchers, A. F. Nelson and W. B. Craig.

Frese, George Luckey, Toledo, O. (Ontario and Chicago Veterinary College, 1902). Vouchers, F. M. Jeffrey and A. J. Kline.

Ferguson, William Prince, Grenad, Miss. (Chicago Veterinary College, 1904). Vouchers, E. M. Ranck, C. J. Marshall, J. R. Mohler, President.

Fogle, Charles W., Leipsic, O. (Ontario Veterinary College, 1907). Vouchers, A. S. Colley and Reuben Hilty.

Egan, Peter I., San Francisco, Cal. (San Francisco Veterinary College, 1912). Vouchers, Wm. F. Egan and David F. Fox.

Gallagher, Bernard Alfred, Washington, D. C. (N. Y. State Veterinary College, 1901). Vouchers, H. J. Washburn and Jacob Traum.

Hawke, Walter Lawson, Alberta. (Ontario Veterinary College, 1911). Vouchers, E. A. Watson and J. C. Hargrave.

Hamilton, Melancthon, Delhi, N. Y. (N. Y. State Veterinary College, 1905). Vouchers, J. F. DeVine and Harry D. Gill.

Jones, James M., Lewisburg, Tenn. (McKillip Veterinary College, 1912). Vouchers, M. Jacob and G. R. White.

Lewis, Harold Matson, Nashua, N. H. (Chicago Veterinary College, 1908). Vouchers, George D. Darrah and Francis S. Allen.

Letteney, James Tempany, Rochester, N. Y. (Ontario Veterinary College, 1908). Vouchers, George D. Darrah and Francis S. Allen.

Leach, Edward David, Ft. Wayne, Ind. (The Chicago Veterinary College, 1908). Vouchers, O. L. Boor and Wm. F. Myers.

Noback, Charles Victor, New York City (N. Y. S. V. C., Cornell, 1911). Vouchers, E. B. Ackerman and J. F. DeVine.

Pope, George W., Washington, D. C. (Chicago Veterinary College, 1889). Vouchers, C. J. Marshall and J. R. Mohler.

Parker, Leon Luther, Catskill, N. Y. (N. Y. S. V. C., Cornell, 1910). Vouchers, V. A. Moore, J. R. Mohler and J. C. Marshall.

Rivers, Reuben N., Lansdale, Pa. (V. P., 1901). Vouchers, Edward Records and W. J. Lentz.

Richards, William Wilson, Manila, P. I. (Ontario Veterinary College, 1897). Vouchers, Donald B. Palmer and A. R. Ward.

Sunderville, Earl, Ithaca, N. Y. (N. Y. State Veterinary College, 1908). Vouchers, V. A. Moore and S. H. Burnett.

Stevens, Cecil H., Stevensville, Mont. (University of Pennsylvania, 1911). Vouchers, W. C. Orr, President, Mont. Vet. Association and A. D. Knowles, Secretary and Treasurer, M.V.M.A.

Snell, Noble Russell, Chicago, Ill. (Chicago Veterinary College, 1913). Vouchers, Joseph Hughes and John F. Ryan.

Schreck, Oscar, New Haven, Conn. (McKillip Veterinary College, 1910). Vouchers, Charles H. Beere and Peter T. Keeley.

Totten, George E., Pittsburgh, Penn. (Chicago Veterinary College 1898). Vouchers, J. H. Rietz and Philip K. Jones.

Truex, Blair W., Burr Oak, Kansas (Grand Rapids Veterinary College, 1913). Vouchers, J. R. Mohler and C. J. Marshall.

Vollmer, Carl G., Ottawa, O. (Ontario Veterinary College, 1913). Vouchers, J. H. Blattenberg and J. D. Fair.

Wagner, Charles Otto, Hopkinsville, Ky. (McKillip Veterinary College, 1913). Vouchers, G. P. Isbell and P. H. Youngblood.

On motion duly seconded and passed, the committee adjourned at 3 P.M.

Attest:
C. J. Marshall,
Secretary.

Second Meeting

The second meeting of the Executive Committee was held at the Hotel Astor, on Saturday, August 30, 1913, at 3 P.M. Dr. S. Stewart in the chair.

The following members were present: Doctors Stewart, Mohler, Marshall, Gill, Roberts, Moore, Jensen, White, Hughes, Torrance, Adams, Cotton and Fox.

Member absent, Dr. A. D. Melvin.

On motion duly seconded and passed it was voted to recommend to the Association that the name of Dr. F. T. Daubigny, of Montreal, Canada, be reinstated on the list of members of the ssociation.

On motion duly seconded and passed it was voted to recommend to the Association that the resignation of Dr. G. W. Browning, of Montgomery, Ala., be accepted.

On motion duly seconded and passed it was voted to recommend to the Association that the resignation of Dr. F. C. Grenside, of Guelph, Ont., as a member of the Association be accepted.

On motion duly seconded and passed it was voted to recommend to the Association that the matter of considering invitations from different places in which to hold the next annual meeting be referred to the incoming Executive Committee.

On motion duly seconded and passed it was voted to recommend to the Association that the Librarian be authorized and directed to place the Royal Agricultural and Veterinary College of Copenhagen, Denmark, and the Veterinary Institute of Stockholm, Sweden, as entitled to a copy of the future *Proceedings* and publications of this Association, and that he be further directed to send to said institutions, and to all other European veterinary colleges which had not received the same a set of the back numbers of the *Proceedings* of this Association so far as, in the judgment of the Librarian, the same can be spared without detriment to the needs of this body, and the members thereof.

On motion duly seconded and passed, the Committee adjourned to 8 A.M., Tuesday, September 2, 1913.

Attest:

C. J. MARSHALL,
Secretary.

THIRD MEETING

The third meeting of the Executive Committee was held at the Hotel Astor, New York, on September 2, 1913, at 8 A.M., Dr. S. Stewart, in the chair.

The following members were present: Doctors Marshall, Stewart, Mohler, Gill, Moore, Hughes, Fox, Roberts, Jensen, Cotton and White.

Members absent, Doctors Melvin, Adams and Torrance.

Member appointed to fill vacancy, Dr. Hoskins.

On motion duly seconded and passed it was voted to recommend to the Association that the following applicants be elected to membership:

BRAISTED, WM. F., New York City (American Veterinary College, 1898). Vouchers, Robert W. Ellis and R. H. Kingston.

CALLICOTTE, J. K., Okla. City, Okla. (K. C. V. C., 1906). Vouchers, J. R. Mohler and C. J. Marshall.

CURRAN, MATTHEW JOHN, New Bedford, Mass. (McKillip Veterinary College, 1910). Vouchers, E. F. Ryan and Thomas E. Maloney.

EAGLE, JOHN G., Kansas City, Mo. (Kansas City Veterinary College, 1904). Vouchers, S. Stewart and F. F. Brown.

HAYES, JOHN J., New York City (New York American, 1900). Vouchers, W. Reid Blair and Robert W. Ellis.

RUSSELL, E. EVERETT, Farmington, Maine (Ontario Veterinary College, 1908). Vouchers, A. L. Murch and A. Joly.

TRAINOR, PETER F., Jersey City (N. Y. American, 1907). Vouchers, Charles C. Schloemer and Thomas C. Smith.

On motion duly seconded and passed, the committee adjourned to 5 P.M.

Attest:

C. J. MARSHALL,
Secretary.

Fourth Meeting

The fourth meeting of the Executive Committee was held at the Hotel Astor, on Tuesday, September 2, at 5 P.M., Dr. S. Stewart in the chair.

The following members were present: Doctors Stewart, Mohler, Torrance, Hughes, Fox, Roberts, White, Marshall, Cotton and Hoskins.

Members absent: Doctors Melvin, Gill and Adams.

On motion duly seconded and passed, it was voted to recommend to the Association that the Secretary be authorized to secure a suitable frame or case for each of the medals in the possession of the Association, commemorative of the work and services of Dr. Arloing, and to send one to each of the colleges, the graduates of which are eligible to membership in this Association.

Moved, seconded, and passed, that recommendations on the proposed amendments of the By-laws, be deferred until receipt of the report of the Committee on Reorganization.

On motion duly seconded and passed, it was voted to recommend to the Association that the following applicants be elected to membership.

Amling, Henry, V.S., New York City (N. Y. College of Veterinary Surgery and School of Comparative Medicine, 1893). Vouchers, Robert S. MacKellar, V.S. and Harry D. Gill, V. S.

Bose, Robert Girard, D.V.S., Troy, N. Y. (New York University, 1901). Vouchers, D. H. Gill, V.S. and Robert W. Ellis, D.V.S.

Brotheridge, Herbert J., Brooklyn, N. Y. (N. Y. College Veterinary Surgery, 1894). Vouchers, E. Hanshew, D.V.S. and Robert S. MacKellar, V. S.

Beers, Harry H., D.V.S., Mount Joy, Pa. (American Veterinary College, 1893). Vouchers, W. Horace Hoskins, D.V.S. and Jacob Helmer, D.V.S.

Courtright, John M., D.V.S., Easton, Pa. (National Veterinary College, 1895). Vouchers, W. Horace Hoskins, D.V.S. and Chester M. Hoskins, V.M.D.

Cheney, George LeRoy, New Haven, Conn. (Ontario Veterinary College, 1908). Vouchers, Grove W. Loveland and Harrison Whitney M.D.V. (Harvard).

Flaherty, James Jeremiah, V.M.D., New Haven, Conn. (University of Pennsylvania, 1912). Vouchers, Harrison Whitney, M.D.V. (Harvard) and Grove W. Loveland, M.D.C.

Flowers, Royal G., V.S., Ft. Worth, Texas (Ontario Veterinary College, 1906). Vouchers, C. E. Mauldin, V.M.D. and P. G. Hoffman, D.V.S.

Freed, B. M., V.S., Sharon, Pa. (Ontario Veterinary College, 1891). Vouchers, F. H. McCarthy and F. H. Schneider.

Grover, Arthur L., D.V.S., New York City (American Veterinary College, 1897). Vouchers, Robert S. MacKellar, V.S. and R. W. Kingston, D.V.S.

Graves, Henry F., V.S., D.V.S., Olympia, Wash. (Wash. State College, 1910). Vouchers, J. T. Seely, M.D.C. and Carl Cozier, M.D.C.

Ide, Almond H., New York (Ontario Veterinary College, 1899). Vouchers, V. A. Moore, M.D., V.M.D. and C. P. Fitch, M.S., D.V.M.

Kean, Thomas J., V.M.D., M.D., Philadelphia, Pa. (University of Pennsylvania, 1890). Vouchers, Herbert Hoopes, V.M.D., Charles A. Schaufler and C. J. Marshall, V.M.D.

Miller, John P., V.M.D., Reading, Pa. (University of Pennsylvania, 1899). Vouchers, Herbert Hoopes, V.M.D., C. J. Marshall, V.M.D. and W. Horace Hoskins, D.V.S.

Murphy, Francis Patrick, V.M.D., Philadelphia, Pa. (University of Pennsylvania, 1913). Vouchers, C. J. Marshall and F. H. Schneider.

Rohrer, C. G., D.V.S., New York City (N. Y. American Veterinary College, 1908). Vouchers, J. F. DeVine, D.V.S. and Robert S. MacKellar, V.S.

Runyon, Peter Field, V.M.D., Freehold, N. J. (University of Pennsylvania, 1912). Vouchers, Thomas E. Smith, V.S. and J. T. Glennon, V.S.

Switzer, Wm. B., Oswego, N. Y. (Ontario Veterinary College, 1893). Vouchers, V. A. Moore, M.D., V.M.D. and F. W. Andrews, D.V.M.

Townsend, Norris L., V.M.D., Ridgewood, N. J. (University of Pennsylvania, 1899). Vouchers, John B. Hopper, D.V.S. and J. Payne Lowe, D.V.S.

Vail, Irving Roe, D.V.M., New Haven, Conn. (N. Y. State Veterinary College, Cornell, 1911). Vouchers, Grove W. Loveland and Harrison Whitney, M.D.V. (Harvard).

Waters, R. E., D.V.S., Brooklyn, N. Y. (Columbia Veterinary College, 1884). Vouchers, E. Hanshew, D.V.S. and Robert S. MacKellar, D.V.S.

Wiltraut, Frank Adams, V.S., Wilkesbarre, Pa. (Ontario Veterinary College, 1887). Vouchers, Louis A. Klein and C. J. Marshall, V.M.D.

Woodside, James H., D.V.M., Redmond, Wash. (N. Y. State Veterinary College, 1909). Vouchers, F. O. Anders, D.V.M. and J. P. Seely, M D.C.

Attest:

C. J. Marshall,
Secretary.

Fifth Meeting

The fifth meeting of the Executive Committee was held at the Hotel Astor on Wednesday, September 3, at 5 p.m., Dr. S. Stewart in the chair.

The following members were present: Doctors S. Stewart, Marshall, Jensen, Moore, Gill, Mohler, Hughes, Fox, Roberts, White, Cotton and Adams.

Members absent, Doctors Melvin and Torrance.

Members to fill vacancies, Doctors Cary and Reynolds.

On motion duly recorded and passed it was voted to recommend to the Association the passage of the following vote: "That it is the sense of the Association that it hold its meeting for 1915 at San Francisco, Cal."

On motion duly recorded and passed it was voted to recommend to the Association that the following applicants for membership be admitted.

BUCKLEY, JOHN M., Brooklyn, N. Y. (American Veterinary College 1891). Vouchers, E. B. Ackerman and George W. Meyer.

CHESLEY, GUY E., Rochester, N. H. (University of Pennsylvania, Veterinary School, 1898). Vouchers, John R. Mohler, President, and C. J. Marshall, Secretary.

DERONDE, JOHN D., New York City, (American Veterinary College, 1887). Vouchers, E. B. Ackerman and George W. Meyer.

HAZEL, GEORGE A., New York City (New York-American Veterinary College, 1902). Vouchers, E. B. Ackerman and George W. Meyer.

JOHNSON, AUGUSTUS F., New York City (New York College of Veterinary Surgeons, 1896). Vouchers, E. B. Ackerman and W. Reid Blair.

On motion duly recorded and passed it was voted to recommend to the Association that beginning with the year 1914, graduates of St. Joseph Veterinary College, of St. Joseph, Mo., shall be eligible to membership in the Association.

On motion duly recorded and passed it was voted to recommend to the Association that beginning with the year 1914, graduates of the United States College of Veterinary Surgeons shall be eligible to membership in this Association.

On motion duly recorded an passed it was voted to recommend to the Association that upon the presentation of an application in proper form Dr. J. R. Mahaffy, of Wilmington, Del., be reinstated to membership in the Association.

On motion duly recorded and passed it was voted to recommend to the Association that the proposal of Dr. Ackerman to amend the Constitution and By-laws by striking out the whole of Section 12 of Article VII, providing for a nominating committee, and substituting in lieu thereof the language, "All nominations for office in this Association shall be made from the floor," be adopted.

On motion the committee adjourned.

Attest:

C. J. Marshall,
Secretary.

Sixth Meeting

The sixth meeting of the Executive Committee was held at the Hotel Astor, Thursday, September 4, at 8 A.M., Dr. S. Stewart in the chair.

The following members were present: Doctors Stewart, White, Fox, Roberts, Moore, Hughes, Gill, Cotton, Mohler and Marshall.

Members absent: Doctors Melvin, Torrance and Adams.

On motion duly seconded and passed it was voted to recommend to the Association that Prof. Francis Hutyra, Dean of the Royal Veterinary High School of Budapest, Hungary; Prof. Robert Von Ostertag, Veterinary Director, Imperial Board of Health, Berlin; and Sir Stewart Stockman, Chief Veterinarian, Board of Agriculture, London, be elected to honorary membership.

On motion duly seconded and passed it was voted to recommend to the Association that the following vote be passed: "That it is the sense of the Association that the raising of large sums of money by local committees to be used for entertaining this Association should be discouraged for the reason that it prevents the presentation of invitations to hold our meetings in many places where it would be for the advantage of the Association and the profession that we should go."

On motion duly seconded and passed it was voted to recommend to the Association that the proposed amendment to Section 2 of Article III, of the Constitution providing that the members of the Executive Committee now appointed by the President shall be elected by the Association be rejected.

On motion duly seconded and passed it was voted to recommend to the Association that the proposed amendment to Article VI, of the By-laws concerning the election of members of the Executive Committee for various terms be rejected.

On motion duly seconded and passed it was voted to recommend to the Association that the proposed amendment to Section 1 of Article VIII of the By-laws requiring an applicant for membership to be a member in good standing of a regularly organized veterinary association, where the same exists in state or province from which the applicant comes, be rejected.

On motion duly seconded and passed it was voted to recommend to the Association that the recommendation of the Committee on College Investigations with reference to the subjects required to be taught in schools the graduates of which are eligible to membership in this organization as mentioned on page 175 of the *Proceedings* for 1912 be adopted.

On motion duly seconded and passed it was voted to recommend to the Association that the Committee on College Investigations be continued for the next year, and that a fund not exceeding the sum of five hundred dollars ($500) be set aside to pay their expenses.

On motion duly seconded and passed it was voted to recommend to the association that the list of Veterinary Colleges approved by the Committee on College Investigations as complying with the requirements of this Association be adopted; said list being as follows:[1]

Alabama Polytechnic Institute, College of Veterinary Medicine.
Chicago Veterinary College.
Cincinnati Veterinary College.
Colorado State College, Division of Veterinary Medicine.
George Washington University, College of Veterinary Medicine.
Grand Rapids Veterinary College.
Indiana Veterinary College.
Iowa State College, Division of Veterinary Medicine.
Kansas City Veterinary College.
Kansas State Agricultural College, Veterinary Department.
McKillip Veterinary College.
Michigan Agricultural College, Department of Veterinary Medicine.
New York State Veterinary College, New York City.
New York State Veterinary College, Ithaca.
Ohio State University, College of Veterinary Medicine.
St. Joseph Veterinary College, beginning with the graduates of 1914.
San Francisco Veterinary College.
State College of Washington, Veterinary Department.
Terre Haute Veterinary College.
United States College of Veterinary Surgeons, beginning with graduates of 1914.
University of Pennsylvania, School of Veterinary Medicine.

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[1] See footnote on page 350.

On motion duly seconded and passed, it was voted to recommend to the Association that the Committee on Reorganization be continued, that it be directed to file with the Secretary on or before March 15, 1914, such report or reports as the Committee or any of its members shall prepare, and the Secretary shall thereupon cause such reports to be printed in pamphlet form and distributed to the members of the Association for study and suggestions. Also that the Secretary be directed to furnish within thirty days to each member of the committee a copy of the reports which has so far been prepared and submitted and several recommendations from officers and committees relating to changes of Constitution and By-laws which were submitted during the meeting of 1913.

On motion duly seconded and passed it was voted to recommend to the Association that the recommendations contained in the report of the Librarian be referred to the Committee on Reorganization.

On motion duly seconded and passed it was voted that the application of Dr. James R. Mahaffy, of Wilmington, Del., for membership in the Association be granted.

Mahaffy, James R., Wilmington, Del. (University of Pennsylvania 1896). Vouchers, H. P. Eves, J. R. Mohler and C. J. Marshall.[1]

There being no further business the committee adjourned to Friday, September 5, at 11.30 A.M.

Attest:

C. J. Marshall,
Secretary.

Seventh Meeting

The seventh meeting of the Executive Committee was held at the Hotel Astor at 11.30 A.M., Friday, September 5, 1913, Dr. S. Stewart presiding.

The following members were present: Doctors Stewart, Fox, Hoskins, Mohler, Cotton, White and Marshall.

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[1] Under suspension of the By-laws by unanimous consent, the following applicants were elected to membership at the afternoon session of September 5: F. M. Cahill, St. Joseph, Mo.; Ernest I. Patterson, Mound City, Mo.; J. E. Shelton, Arkansas City, Kans.; and Wm. B. Tipton, Emporia, Kansas.

Members absent: Doctors Torrance, Adams, Jensen, Gill and Melvin.

Members to fill vacancies: Doctors Hoskins, Brenton, Dalrymple and Cary.

On motion duly seconded and passed it was voted to recommend to the Association that the Special Committee on Glanders be continued, and that a sum not exceeding three hundred dollars ($300) be set aside by the Treasurer for the expenses of said committee.

On motion duly seconded and passed it was voted to recommend to the Association that a sum not exceeding $1000 be set aside by the Treasurer for the expenses of the Committee on Legislation.

On motion duly seconded and passed it was voted to recommend to the Association that the By-laws be suspended and that the salary of the Secretary be increased to the sum of $750 for the next year.

There being no further business the committee adjourned without day.

Attest:

C. J. Marshall,
Secretary.

A Voice: I move that the report of the first two meetings be received and the several recommendations be taken up seriatim. (Motion seconded.)

President Mohler: It has been moved and seconded that the report of the Executive Committee be received and the several recommendations taken up seriatim. All in favor of this motion please give their consent by saying aye; opposed, no. The ayes have it.

A Voice: I move the election of all of those members whose names were read as having been approved by the Executive Committee, that the By-laws be suspended and that the Secretary cast the ballot. (Motion seconded).

President Mohler: It has been moved and seconded that the By-laws be suspended and that the names as read by the chairman of the Executive Committee be voted for by the secretary casting the ballot. All in favor of this motion will signify by saying aye; those opposed, no. It is carried.

Dr. Marshall: Mr. President, I hereby cast the ballot for the election to membership of those men whose names were read by the chairman of the Executive Committee.

President Mohler: I take great pleasure in announcing that these men have been elected to membership in the A. V. M. A.

The second recommendation is to reinstate Dr. F. T. Daubigny on the list of membership.

A Voice: I move that the recommendation be approved. (Seconded and carried.)

Dr. Stewart: "On motion duly seconded and passed, it was voted to recommend to the Association that the resignation of Dr. G. W. Browning, of Montgomery, Alabama, be accepted."

A Voice: I move that the recommendation of the Executive Committee be adopted. (Motion seconded and passed.)

Dr. Stewart: "On motion duly seconded and passed it was voted to recommend to the Association that the resignation of Dr. F. Grenside, of Guelph, Ontario, as a member of the Association be accepted."

A Voice: I move that the recommendation be approved. (Motion seconded and carried.)

Dr. Stewart: "On motion duly seconded and passed, it was voted to recommend to the Association that the matter of considering invitations from different places in which to hold the next annual meeting be referred to the incoming Executive Committee."

A Voice: I move its acceptance. (Motion seconded and passed.)

Dr. Stewart: "On motion duly seconded and passed, it was voted to recommend to the Association that the Librarian be authorized and directed to place the Royal Agricultural and Veterinary College of Copenhagen, Denmark, and the Veterinary Institute of Stockholm, Sweden, on the list as entitled to a copy of the future *Proceedings* and publications of this Association and that he be further directed to send to said institutions, and to all other European veterinary colleges which had not received the same, a set of the back numbers of the *Proceedings* of this Association so far as, in the judgment of the Librarian, the same can be spared without detriment to the needs of this body, and the members thereof."

A Voice: I move that the recommendation be approved. (Motion seconded and carried.)

A Voice: I move the adoption of the report of the first two meetings as a whole. (Motion seconded.)

President Mohler: It has been moved and seconded that the report of the Executive Committee be adopted as a whole. Are you ready for the question? All in favor please give their consent by saying aye; opposed, no. The ayes have it. It is carried.

Dr. Stewart: I think Mr. Roberts better read this third report.

President Mohler: The chairman will present his report by proxy.

A Voice: Mr. President, I would like to ask a question: was there not a resolution passed a year ago that all applications must be in the hands of the Secretary on the 30th of July? And were these applications all in the hands of the Secretary at that time?

President Mohler: We will have to ask the Secretary.

Dr. Marshall: These applications all came in after August 1, too late to be listed. The Executive Committee passed a resolution to accept those that were in before the date of the meeting.

A Voice: I move that the report of the third meeting be accepted under suspension of the rules. (Motion seconded.)

President Mohler: It is moved and seconded that the report be accepted under suspension of the By-laws of the Association. All in favor of that motion, signify by saying aye; those opposed, no. The ayes have it. It is carried.

A Voice: I move the election of those members to membership whose names have been approved by the Executive Committee, under suspension of the rules, and that the Secretary be instructed to cast a ballot. (Motion seconded and passed.)

Dr. Marshall: Mr. President, I cast the ballot of the Association for the election to membership of those men whose names have just been read in the third report of the Executive Committee.

President Mohler: According to the wishes of the Association, I take great pleasure in announcing the election to membership in this Association of those whose names have just been read.

Dr. Marshall: I might say that this beats the record for any one year. Last year it was 288. This year it will be a few over 300.

A Voice: I move we adjourn. (Motion seconded and passed.)

GENERAL SESSION

Wednesday Morning, September 3, 1913

President Mohler: Gentlemen, please come to order. You will notice by the program this morning that the opening address was to be made by the Honorable W. C. Edwards, of Ottawa, Canada. On Monday we telegraphed Senator Edwards to refresh his memory, but thus far we have received no reply. We have faith, however, that he will be here tomorrow morning in preference to this morning, so we will proceed to the first order of business, and call for the report of the Executive Committee, Dr. Stewart, Chairman. (See Report of the Executive Committee, fourth meeting).

President Mohler: Gentlemen, you have heard the report of the Executive Committee, what is your pleasure?

Dr. Lyman: I move that the report be received and the several recommendations be taken up ad seriatim. (Motion seconded and carried.)

Dr. Stewart: The first recommendation is a motion "to recommend to the Association that the Secretary be authorized to secure a suitable frame or case for each of the medals in the possession of the Association, commemorative of the work and services of Dr. Arloing, and to send one to each of the colleges the graduates of which are eligible to membership in this Association.

Dr. Hoskins: I move the recommendation be approved. (Motion seconded and carried.)

Dr. Stewart: The second recommendation is to recommend to the Association that the applicants whose names have been read, be elected to membership.

Dr. Hoskins: Mr. President, I move that these applications be received under suspension of the rules, and the Secretary be instructed to cast the ballot of this Association for their admission.

President Mohler: It is moved and seconded that these applications be received under suspension of the rules, and that the Secretary cast the ballot. All in favor of this motion will say aye, those opposed no. The ayes have it, and the Secretary will cast the ballot.

Secretary Marshall: By direction of the President, I cast the ballot of the Association for the election to membership of the candidates whose names have just been read.

President Mohler: I therefore declare the gentlemen whose names have just been read, elected to membership in this Association.

Dr. Stewart: That is all of our recommendations.

Dr. Reynolds: I move that the report be adopted as a whole.

(Motion seconded and carried.)

President Mohler: Gentlemen, we will proceed with the next order of business, and call on Dr. Boor for his report of the Committee on Necrology. Is Dr. Boor present this morning? Is there any member of the Committee on Necrology ready to report for the chairman? If not, we will pass that for the time being, as the Secretary says they are still working on the report. The next item of business is the report of the International Commission on Control of Bovine Tuberculosis, J. G. Rutherford, Chairman. I have received a telegram from our colleague, the dhairman of this Commission, and I shall be very glad to read it to you. It is as follows:

Calgary, Alberta, August 31.

Dr. John R. Mohler,
President A. V. M. A., Hotel Astor, N. Y.

Overwhelming pressure official business, partly unforeseen, absolutely precludes my being with you on this historic occasion. Please convey to members my sincere regrets for this enforced absence from the jubilee meeting of the Association which will, I trust be successful far beyond your most sanguine expectations.

J. G. Rutherford.

I am sure we all regret exceedingly the absence of Dr. Rutherford for many reasons. There is a meeting called by the vice-chairman of this commission tomorrow morning, and we will wait until after that time for the report from this commission

I will now call for the report of the Special Committee on Revision of Veterinary Anatomical Nomenclature, Dr. Sisson, Chairman.

Secretary Marshall: Mr. President and Gentlemen: I have received a letter this morning from Dr. Sisson, stating that it will be impossible for him to be with us. He has sent in his report, and I doubt whether it is advisable to read it before the Association. The names that they have suggested are interesting as records for our report, but

I doubt whether it will be interesting to read it for your information at the present time, although it can be done if you wish.

Dr. Mayo: I think if there is any recommendation made in that report, it should be read.

Secretary Marshall: There is no recommendation, only that they have given the name or names of the different organs of the body that they thought should be adopted. It is a long string of names, just the names that they thought ought to be decided upon. You can take it and study it a little, and you will see that it is rather technical.

Dr. Mayo: Mr. President, I move that the reading of the report be dispensed with, and that it be received and referred to the Executive Committee.

President Mohler: You have heard the motion. It has been moved and seconded that the reading of the report be dispensed with, and that it be referred to the Executive Committee to be disposed of in the regular manner. Are there any remarks?

Dr. Murphey: Is this report supposed to be complete?

President Mohler: I have not seen the report personally, and I could not answer that question. I doubt very much whether any report of this character would be complete with only one or two years' work. The intention was merely to report progress on a certain number of names, and from a conversation I had with Dr. Sisson three or four months ago in Kansas City, I believe he is going to report on a certain number, I believe 3000 names at this time, taking up a certain portion of the anatomy.

Secretary Marshall: Mr. President, I think it would be well to read Dr. Sisson's letter of transmission. That would probably give you better information than I can do otherwise. If it is in order, I will read that letter.

President Mohler: Proceed, Mr. Secretary.

REPORT OF COMMITTEE ON REVISION OF VETERINARY ANATOMICAL NOMENCLATURE

By S. Sisson, Chairman
I. E. Newsom S. L. Stewart

Gentlemen:

Your committee has proceeded on the basis formulated in the preliminary report submitted at the annual meeting in Indianapolis and adopted by the Association at that time.

It is not possible at this time to offer a complete list of anatomical terms. For this circumstance the committee has no apology to offer. The magnitude of the undertaking and the numerous difficulties involved are a sufficient explanation of the fact that the list of names is not yet complete. The terms proposed herewith comprise those concerning the bones, joints, muscles, digestive system, respiratory system and urogenital system, and number nearly 3000. When it is known that their selection has involved consideration of some 5000 to 6000 names, it will be recognized that the committee has been fairly active. It has of course been necessary to consult the literature, including the chief English, French, German and Italian works. In some cases studies of anatomical specimens and special preparations had to be made. The work was rendered still more onerous by the fact that a great part of it had to be done by correspondence. The procedure adopted was to make out lists of proposed names in triplicate, one copy for each member of the committee. These lists were carefully gone over and the criticisms and suggestions of the members sent to the chairman and to each member. These were again worked over, in some cases several referenda being necessary concerning terms about which opinion differed. Fortunately there was no difficulty in reaching an agreement on the great majority of names. In a few cases only has the decision been made by a majority vote, since members were usually willing to sacrifice their personal preference in the interest of uniformity.

The committee desires to emphasize the point that exceedingly few new names are proposed in this report, the lists consisting almost entirely of selections from the large number of names now in use.

NOMINA ANATOMICA VETERINARIA

TERMINI, SITUM ET DIRECTIONEM PARTIUM CORPORIS INDICANTES

Termini generales

Verticalis
Horizontalis
Medianus
Sagittalis
Frontalis
Transversalis
Medialis
Intermedius
Lateralis
Medius
Dorsalis
Ventralis
Superior
Inferior
Internus
Externus
Dexter
Sinister
Longitudinalis
Transversus
Cranialis
Caudalis
Oralis
Aboralis
Superficialis
Profundus

Termini ad extremitates spectantes

Proximalis
Distalis
Dorsalis
Volaris
Plantaris
Radialis
Ulnaris
Tibialis
Fibularis

Termini generales

Accessorius
Acinus
Aditus
Ala
Alveolus
Ampulla
Angulus
Ansa
Antrum
Apertura
Apex
Appendix
Arcus
Area
Basis
Brachium
Bulbus
Canaliculus
Canalis
Capsula
Caput
Capitulum
Cartilago
Caruncula
Cauda
Caverna
Cavum
Cellula
Circulus
Cisterna
Collum
Columna
Commissura
Cornu
Corona
Corpus
Corpusculum
Crista
Crus
Decussatio
Dorsum
Ductulus
Ductus
Eminentia
Endothelium
Epithelium
Extremitas
Facies
Fascia
Fasciculus
Fibra
Fibrocartilago
Filum
Fissura
Flexura
Folium
Folliculus
Foramen
Formatio
Fornix
Fossa
Fossula
Fovea
Foveola
Frenulum
Frenum
Fundus
Funiculus
Geniculum
Genu
Glandula
Glomerulus
Glomus
Hilus
Humor
Impressio
Incisura
Infundibulum
Intestinum
Isthmus
Junctura
Labium
Lacuna
Lamina
Latus
Ligamentum
Limbus
Limen
Linea
Liquor
Lobulus
Lobus
Macula
Margo
Massa
Meatus
Medulla
Membrana
Membrum
Mucus
Musculus
Nervus
Nodulus
Nucleus
Organon
Orificium
Os (oris)
Os (ossis)
Ostium
Papilla
Parenchyma
Paries
Pedunculus
Perichondrium
Periosteum
Plexus
Plica
Polus
Processus
Prominentia

- Punctum
- Radix
- Ramulus
- Ramus
- Raphe
- Recessus
- Regio
- Rete
- Rima
- Rudimentum
- Septulum
- Septum
- Sinus
- Spatium
- Spina
- Stratum
- Stria
- Stroma
- Substantia
- Succus
- Sulcus
- Taenia
- Tegmen
- Tela
- Tela conjunctiva
- Tela elastica
- Torus
- Trabecula
- Tractus
- Trigonum
- Trochlea
- Truncus
- Tuber
- Tuberculum
- Tuberositas
- Tubulus
- Tunica
- Tunica propria
- Umbo
- Uvula
- Vagina
- Vallecula
- Vallum
- Valvula
- Vas
- Velum
- Vertex
- Vesica
- Vesicula
- Vestibulum
- Villus
- Viscus (viscera)
- Vortex
- Zona

Partes corporis

- Caput
  - Cranium
    - Occiput
    - Vertex
    - Frons
    - Auris
    - Auricula
  - Facies
    - Oculus
    - Palpebra superior
    - Palpebra inferior
    - Palpebra tertia
    - Rima palpebrarum
    - Bulbus oculi
      - Nasus
      - Nares
      - Alae nasi
      - Rostrum
      - Os
    - Labium superius
    - Labium inferius
    - Rima oris
    - Cavum oris
      - Lingua
      - Fauces
      - Dentes
      - Mentum
- Collum
- Truncus
  - Thorax
    - Cavum thoracis
    - Pectus
  - Dorsum
  - Abdomen
    - Cavum abdominis
    - Umbilicus
    - Lumbus
    - Latus
    - Inguen
    - Penis
    - Praeputium
    - Scrotum
    - Testes
    - Mamma
      - Papilla mammae
  - Pelvis
    - Cavum pelvis
    - Coxa
    - Nates
    - Anus
    - Perineum
    - Vulva
  - Cauda
    - Radix caudae

- Truncus
  - Cauda
    - Apex caudae
- Extremitas thoracicae
  - Axilla
  - Brachium
  - Cubitus
  - Antibrachium
  - Manus
    - Carpus
    - Metacarpus
- Extremitalis thoracicae
  - Manus
    - Digiti manus (I–V)
- Extremitas pelvina
  - Femur
  - Genu
  - Crus
  - Pes
    - Tarsus
    - Metatarsus
    - Digiti pedis (I–V)

Regiones corporis

- Regiones capitis
  - Regio occipitalis
  - R. parietalis
  - R. temporalis
  - R. auricularis
  - Fossa temporalis
  - R. frontalis
  - R. supraorbitalis
  - R. orbitalis
  - R. nasalis
    - Dorsum nasi
    - Apex nasi
      - Nares
      - Planum nasolabiale
      - Rostrum
    - R. lateralis nasi
  - R. infraorbitalis
  - R. buccalis
    - Pars maxillaris
    - P. molaris
    - P. mandibularis
  - R. oralis
    - R. labialis superior
    - R. labialis inferior
    - R. mentalis
  - R. masseterica
  - Spatium mandibulare
- Regiones colli
  - R. cervicalis lateralis
    - R. parotidea
    - R. brachiocephalica
    - Sulcus jugularis
  - R. nuchalis
  - Margo cervicis dorsalis
  - R. cervicalis ventralis
- Regoines colli
  - R. cervicalis ventralis
    - R. laryngea
    - R. thyreoidea
    - R. trachealis
- Regiones thoracis
  - Dorsum
    - R. dorso-scapularis
  - R. thoracis lateralis
  - R. omo-brachialis
  - R. costalis
  - R. axillaris
  - Fossa axillaris
  - R. sternalis
  - R. praesternalis
    - Sulcus medianus pectoris
    - Sulcus lateralis pectoris
- Regiones abdominis
  - R. diaphragmatica
    - R. parachondriaca dextra
    - R. parachondriaca sinistra
    - R. xiphoidea
  - R. mesogastrica
    - R. lumbalis
    - Fossa paralumbalis
    - R. iliaca dextra
    - R. iliaca sinistra
    - R. umbilicalis
  - R. praepelvica
    - R. inguinalis dextra
    - R. inguinalis sinistra
    - R. praepubica
- Regiones pelvis
  - R. sacralis
  - R. glutaea

- Regiones pelvis
  - R. perinealis
    - R. analis
    - R. urogenitalis
- Cauda
  - Radix caudae
- Regiones extremitatis thoracicae
  - R. scapularis
  - R. brachii cranialis
  - R. brachii caudalis
  - R. brachii medialis
  - R. brachii lateralis
  - R. cubiti cranialis
  - R. cubiti caudalis
    - R. olecrani
  - R. cubiti medialis
  - R. cubiti lateralis
  - R. antibrachii dorsalis
  - R. antibrachii volaris
  - R. antibrachii medialis
  - R. antibrachii lateralis
  - R. dorsalis manus
  - R. volaris manus
  - R. carpea dorsalis
  - R. carpea volaris
- Regiones extremitatis thoracicae
  - R. metacarpea dorsalis
  - R. metacarpea volaris
  - R. digitalis (manus) dorsalis
  - R. digitalis (manus) volaris
- Regiones extremitatis pelvinae
  - R. femoris cranialis
  - R. femoris caudalis
  - R. femoris medialis
  - R. femoris lateralis
  - R. trochanterica
  - R. patellaris
  - R. poplitea
  - R. cruris dorsalis
  - R. cruris plantaris
  - R. cruris medialis
  - R. cruris lateralis
  - R. dorsalis pedis
  - R. plantaris pedis
  - R. tarsea dorsalis
  - R. tarsea plantaris
  - R. metatarsea dorsalis
  - R. metatarsea plantaris
  - R. digitalis (pedis) dorsalis
  - R. digitalis (pedis) plantaris

OSTEOLOGIA

- Os longum
- Os breve
- Os planum
- Os irregulare
- Os pneumaticum
- Diaphysis
- Epiphysis
- Synchondrosis epiphyseos
- Apophysis
- Facies articularis
- Periosteum
- Substantia compacta
- Substantia spongiosa
- Cavum medullare
- Medulla ossium
- Medulla ossium flava
- Medulla ossium rubra
- Foramen nutricium
- Canalis nutricius
- Arteriae nutriciae
- Venae nutriciae

COLUMNA VERTEBRALIS

- Vertebrae cervicales
- Vertebrae thoracales
- Vertebrae lumbales
- Vertebrae sacrales
- Vertebrae coccygeae
- Corpus vertebrae
- Fovea costalis cranialis
- Fovea costalis caudalis
- Foramen vertebrale
- Canalis vertebralis
- Arcus vertebrae
- Radix arcus vertebrae

- Incisura vertebralis cranialis
- Incisura vertebralis caudalis
- Foramen intervertebrale
- Sulcus nervi spinalis
- Processus articulares craniales
- Processus articulares caudales
- Processus transversus
- Foramen transversarium
- Canalis transversarius
- Facies articulares transversales
- Fovea costalis transversalis
- Processus spinosus
- Spina ventralis
- Processus costarius
- Processus accessorius
- Processus mammillaris
- Atlas
  - Massa lateralis
  - Foveae articulares craniales
  - Facies articulares caudales
  - Arcus dorsalis
    - Tuberculum dorsale
    - Foramen intervertebrale
  - Arcus ventralis
    - Fovea dentis
    - Tuberculum ventrale
  - Alae atlantis
    - Fossa atlantis
    - Foramen alare

- Atlas
  - Alae atlantis
    - Foramen transversarium
- Axis
  - Dens
- Os sacrum
  - Facies dorsalis
    - Processus spinosi
    - Crista sacralis media
    - Cristae sacrales laterales
    - Cristae sacrales articulares
    - Foramina sacralia dorsalia
  - Facies pelvina
    - Lineae transversae
    - Foramina sacralia ventralia
    - Sulcus vasculosus
  - Pars lateralis
    - Facies auricularis
  - Basis ossis sacri
    - Promontorium
    - Processus articulares craniales
  - Apex ossis sacri
    - Hiatus sacralis
    - Cornua sacralia
  - Canalis sacralis
- Vertebrae coccygeae
  - Sulcus vasculosus
  - Processus haemales
  - Arcus haemalis

THORAX

- Costae
  - Costae sternales
  - Costae asternales
  - Costae fluctuantes
  - Os costale
  - Cartilago costalis
  - Corpus costae
    - Angulus costae
    - Facies lateralis
    - Facies medialis
      - Sulcus costae
    - Margo cranialis
    - Margo caudalis
  - Extremitas vertebralis
    - Capitulum costae
    - Facies articularis capituli costae
    - Sulcus capituli

- Costae
  - Extremitas vertebralis
    - Collum costae
    - Tuberculum costae
    - Facies articularis tuberculi costae
  - Foramen costotransversarium
  - Extremitas sternalis
- Sternum
  - Manubrium sterni
  - Sternebrae
  - Synchondroses sternales
  - Articulatio intersternalis
  - Processus xiphoideus
  - Facies dorsalis
  - Facies ventralis
  - Facies laterales

- Sternum
  - Crista sterni
  - Foveae costales
- Thorax
  - Cavum thoracis
- Thorax
  - Apertura thoracis cranialis
  - Apertura thoracis caudalis
  - Arcus costarum
  - Spatia intercostalia

OSSA CRANII

- Os occipitale
  - Foramen (occipitale) magnum
  - Pars basilaris
  - Pars lateralis
  - Squama occipitalis
  - Margo parietalis
  - Margo mastoideus
  - Tuberculum basilare
  - Condylus occipitalis
  - Incisura intercondyloidea
  - Canalis condyloideus
  - Foramen condyloideum
  - Foramen hypoglossi
  - Canalis hypoglossi
  - Fossa condyloidea
  - Processus paramastoideus
  - Planum parietale
  - Planum nuchale
  - Crista nuchae
  - Linea nuchae
  - Protuberantia occipitalis externa
  - Crista occipitalis externa
  - Crista parietalis externa
  - Foramen lacerum orale
  - Foramen lacerum aborale
- Os sphenoidale
  - Os praesphenoidale
  - Os postsphenoidale
  - Corpus
    - Facies cerebralis
    - Fossa hypophyseos
    - Sella turcica
    - Dorsum sellae
    - Processus clinoideus
    - Sulcus chiasmatis
    - Foramen opticum
    - Canalis opticus
    - Jugum sphenoidale
    - Limbus sphenoidalis
  - Spina ethmoidalis
  - Sinus sphenoidalis
- Os sphenoidale
  - Septum sinuum sphenoidalium
  - Synchondrosis sphenooccipitalis
  - Crista sphenooccipitalis
- Ala orbitalis
  - Facies cerebralis
  - Impressiones digitatae
  - Facies orbitalis
  - Foramen ethmoidale
  - Incisura ethmoidalis
  - Foramen trochleare
- Ala temporalis
  - Facies cerebralis
  - Sulci nervorum
  - Foramen orbitale
  - Foramen rotundum
  - Foramen orbitorotundum
  - Facies temporalis
  - Crista pterygoidea
  - Incisura carotica
  - Incisura ovalis
  - Foramen ovale
  - Incisura spinosa
  - Processus pterygoideus
    - Canalis alaris
    - Foramen alare orale
    - Foramen alare aborale
    - Foramen alare parvum
    - Canalis pterygoideus
- Os ethmoidale
  - Lamina cribrosa
    - Facies cerebralis
    - Fossae ethmoidales
    - Crista galli
  - Lamina perpendicularis
  - Labyrinthus
  - Ethmoturbinalia
  - Endoturbinalia
  - Ectoturbinalia
  - Meatus ethmoidales
  - Sinus ethmoidalis

- Os ethmoidale
  - Lamina lateralis
  - Lamina transversalis
- Os interparietale
  - Facies parietalis
  - Facies cerebralis
    - Protuberantia occipitalis interna
    - Tentorium osseum
- Os parietale
  - Facies parietalis
    - Crista parietalis externa
  - Facies cerebralis
    - Impressiones digitatae
    - Juga cerebralia
    - Sulci vasculosi
    - Crista parietalis interna
    - Sulcus sagittalis
    - Sulcus transversus
- Os frontale
  - Pars nasofrontalis
    - Facies frontalis
    - Crista frontalis externa
    - Torus frontalis
    - Processus cornu
      - Collum
      - Corona
    - Facies cerebralis
    - Crista frontalis interna
    - Incisura ethmoidalis
    - Facies nasalis
    - Processus zygomaticus
    - Fossa glandulae lacrimalis
    - Foramen supraorbitale
    - Sulcus supraorbitalis
    - Canalis supraorbitalis
    - Sinus frontalis
    - Septum sinuum frontalium
  - Pars orbitalis
    - Incisura sphenoidalis
    - Foramen ethmoidale
    - Fovea trochlearis
    - Margo orbitalis
  - Pars temporalis
- Os temporale
  - Squama temporalis
    - Facies cerebralis
    - Facies temporalis
- Os temporale
  - Squama temporalis
    - Facies temporalis
    - Processus zygomaticus
    - Arcus zygomaticus
    - Condylus temporalis
    - Cavitas glenoidalis
    - Processus postglenoidalis
    - Foramen postglenoidale
    - Processus caudalis
    - Crista temporalis
    - Fossa temporalis
  - Pars petrosa
    - Facies lateralis
    - Processus mastoideus
      - Sulcus vasculosus
    - Foramen mastoideum
    - Foramen faciale
    - Meatus temporalis
    - Facies medialis
    - Meatus acusticus internus
    - Porus acusticus internus
    - Apertura externa aquaeductus vestibuli
    - Apertura externa aquaeductus cochleae
    - Facies oralis
    - Crista petrosa
    - Facies aboralis
    - Basis
    - Processus hyoideus
    - Vagina processus hyoidei
  - Pars tympanica
    - Processus acusticus externus
    - Meatus acusticus externus
    - Processus muscularis
    - Tuba auditiva ossea
    - Bulla ossea
      - Cellulae tympanicae
    - Cavum tympani
  - Canalis facialis
  - Canalis petrosus
  - Aquaeductus vestibuli
  - Aquaeductus cochleae
  - Canalis nervi trigemini
  - Canalis caroticus
  - Canalis petrobasilaris

OSSA FACIEI

- Maxilla
  - Corpus maxillae
  - Facies lateralis
    - Crista facialis
    - Tuber faciale
    - Foramen infraorbitale
  - Facies nasalis
    - Sulcus lacrimalis
    - Crista turbinata ventralis
    - Hiatus maxillaris
    - Canalis palatinus
  - Margo dorsalis
  - Margo ventralis
    - Processus alveolaris
    - Limbus alveolaris
    - Alveoli dentales
    - Septa interalveolaria
    - Foramina alveolaria
    - Juga alveolaria
    - Margo interalveolaris
    - Tuber alveolare
  - Tuber maxillare
  - Foramen maxillare
  - Foramen palatinum aborale
  - Foramen sphenopalatinum
  - Processus zygomaticus
  - Processus frontalis
  - Processus palatinus
    - Facies nasalis
    - Crista nasalis
    - Facies palatina
      - Sulcus palatinus
      - Foramen palatinum orale
      - Foramina palatina accessoria
      - Sulci palatini transversi
    - Margo medialis
  - Sinus maxillaris
    - Septum sinus maxillaris
  - Canalis infraorbitalis
  - Canalis alveolaris incisivus
- Premaxilla
  - Corpus premaxillae
    - Facies labialis
    - Facies palatina
    - Facies medialis
    - Foramen incisivum
    - Limbus alveolaris
- Premaxilla
  - Corpus premaxillae
    - Alveoli dentales
    - Septa interalveolaria
    - Margo interalveolaris
  - Processus nasalis
    - Facies lateralis
    - Facies medialis
    - Margo dorsalis
      - Incisura nasomaxillaris
    - Margo ventralis
  - Processus palatinus
    - Facies nasalis
    - Facies palatina
    - Margo medialis
    - Margo lateralis
    - Fissura palatina
- Os palatinum
  - Pars horizontalis
    - Facies nasalis
    - Facies palatina
    - Crista nasalis
    - Spina nasalis aboralis
    - Processus pterygoideus
    - Margo medialis
    - Margo oralis
    - Margo aboralis
  - Pars perpendicularis
    - Facies nasalis
    - Facies maxillaris
      - Fossa pterygopalatina
      - Foramen palatinum aborale
      - Foramen sphenopalatinum
    - Sinus palatinus
- Os pterygoideum
  - Facies medialis
  - Facies lateralis
  - Hamulus pterygoideus
  - Sulcus hamuli pterygoidei
  - Canalis pterygoideus
- Os nasale
  - Facies facialis
  - Facies nasalis
    - Crista turbinata dorsalis
  - Margo medialis
  - Margo lateralis
  - Extremitas oralis

- Os nasale
  - Extremitas aboralis
- Os lacrimale
  - Facies orbitalis
    - Fossa sacci lacrimalis
    - Foramina lacrimalia
    - Fovea musculi obliqui oculi ventralis
  - Facies facialis
    - Tuberculum lacrimale
    - Fossa lacrimalis externa
  - Margo orbitalis
  - Facies nasalis
    - Canalis lacrimalis osseus
  - Sinus lacrimalis
  - Bulla lacrimalis
- Os zygomaticum
  - Facies facialis
    - Crista facialis
  - Facies orbitalis
  - Margo orbitalis
  - Processus zygomaticus
  - Processus frontalis
- Os turbinatum dorsale
- Os turbinatum ventrale
- Vomer
  - Sulcus vomeris
  - Alae vomeris
  - Incisura vomeris
- Mandibula
  - Corpus mandibulae
    - Facies lingualis
    - Facies mentalis
      - Foramen mentale
    - Limbus alveolaris
    - Alveoli dentales
    - Margo interalveolaris
  - Ramus mandibulae
  - Angulus mandibulae
  - Processus angularis
  - Spatium mandibulare
  - Pars molaris
  - Facies medialis
    - Foramen mandibulare
    - Fossa pterygoidea
    - Linea myloidea
  - Facies lateralis
    - Fossa masseterica
  - Margo dorsalis

- Mandibula
  - Margo dorsalis
    - Limbus alveolaris
    - Alveoli dentales
  - Margo ventralis
    - Incisura vasorum
  - Canalis mandibulae
  - Canalis alveolaris incisivus
  - Condylus mandibulae
  - Collum mandibulae
  - Fovea pterygoidea
  - Processus coronoideus
  - Incisura mandibulae
  - Symphysis mandibulae
- Os hyoideum
  - Corpus ossis hyoidei
  - Processus lingualis
  - Cornua thyreoidea
  - Cornua minora
  - Cornua intermedia
  - Cornua styloidea
  - Cartilago tympanica
- Cranium
  - Calvaria
  - Lamina externa
  - Diploë
  - Canales diploici
  - Lamina interna
  - Facies ossea
  - Vertex
  - Frons
  - Occiput
  - Basis cranii interna
  - Basis cranii externa
  - Cavum cranii
  - Fossa cranii oralis
  - Fossa cranii media
  - Fossa cranii aboralis
  - Juga cerebralia
  - Impressiones digitatae
  - Sulci venosi
  - Sulci arteriosi
  - Sulci nervosi
  - Foveolae granulares
  - Ossa suturarum
  - Norma frontalis
  - Norma lateralis
  - Norma basalis
  - Norma nuchalis

- Cranium
  - Fossa temporalis
  - Arcus zygomaticus
  - Fossa infratemporalis
  - Apertura nasi ossea
  - Cavum nasi
  - Septum nasi osseum
  - Meatus nasi dorsalis
  - Meatus nasi medius
  - Meatus nasi ventralis
  - Meatus nasi communis
  - Meatus ethmoidales
  - Meatus nasopharyngeus
  - Choanae
  - Palatum durum
  - Orbita
  - Aditus orbitae
  - Margo supraorbitalis
  - Margo infraorbitalis
  - Paries medialis
  - Paries lateralis
  - Paries dorsalis
  - Paries ventralis
- Suturae cranii
  - Sutura parietofrontalis
  - Sutura parietalis
  - Sutura parietooccipitalis
  - Sutura occipitomastoidea
  - Sutura sphenofrontalis
  - Sutura sphenosquamosa
  - Sutura sphenoethmoidalis
  - Sutura sphenoparietalis
  - Sutura squamosa
  - Sutura frontalis
  - Sutura nasofrontalis
  - Sutura frontoethmoidalis
  - Sutura frontolacrimalis
  - Sutura frontopalatina
  - Sutura frontomaxillaris
  - Sutura zygomaticotemporalis
  - Sutura zygomaticolacrimalis
  - Sutura zygomaticomaxillaris
  - Sutura nasalis
  - Sutura nasomaxillaris
  - Sutura lacrimomaxillaris
  - Sutura palatomaxillaris
  - Sutura temporomaxillaris
  - Sutura premaxillomaxillaris
  - Sutura premaxillaris
- Suturae cranii
  - Sutura palatina mediana
  - Sutura palatina transversa
- Synchondroses cranii
  - Synchondrosis sphenooccipitalis
  - Synchondrosis intersphenoidalis
  - Synchondrosis intraoccipitalis dorsalis
  - Synchondrosis intraoccipitalis ventralis
- Ossa extremitatis thoracicae
  - Cingulum extremitatis thoracicae
    - Scapula
      - Facies costalis
        - Fossa subscapularis
        - Lineae musculares
        - Facies serrata
      - Facies lateralis
        - Spina scapulae
        - Tuber spinae
        - Acromion
        - Fossa supraspinata
        - Fossa infraspinata
        - Sulci vasculosi
        - Foramen nutricium
      - Margo vertebralis
      - Cartilago scapulae
      - Margo cranialis
      - Margo caudalis
      - Angulus cranialis
      - Angulus caudalis
      - Angulus glenoidalis
        - Cavitas glenoidalis
        - Incisura glenoidalis
        - Collum scapulae
        - Tuber scapulae
        - Processus coracoideus
      - Clavicula
    - Humerus
      - Extremitas proximalis
        - Caput humeri
        - Collum humeri
        - Tuberositas lateralis
        - Tuberositas medialis
        - Sulcus intertuberalis
      - Corpus humeri
        - Facies lateralis
          - Sulcus muscularis
          - Crista humeri

- Ossa extremitatis thoracicae
  - Cingulum extremitatis thoracicae
    - Humerus
      - Corpus humeri
        - Facies lateralis
          - Tuberositas deltoidea
        - Facies medialis
          - Tuberositas teres
        - Facies cranialis
        - Facies caudalis
      - Extremitas distalis
        - Condylus medialis
        - Condylus lateralis
        - Epicondylus medialis
        - Epicondylus lateralis
        - Crista condyloidea lateralis
        - Fossa coronoidea
        - Fossa olecrani
        - Foramen supracondyloideum
    - Radius
      - Extremitas proximalis
      - Capitulum radii
        - Facies articularis humeralis
        - Fovea capituli
        - Facies articularis ulnaris
      - Collum radii
        - Processus coronoideus
        - Tuberositas radii
        - Tuberositas proximalis lateralis
        - Tuberositas proximalis medialis
      - Corpus radii
        - Facies dorsalis
        - Facies volaris
          - Margo lateralis
          - Margo medialis
          - Spatium interosseum antibrachii
        - Extremitas distalis
          - Facies articularis carpea
          - Processus styloideus
          - Incisura ulnaris
          - Tuberositas distalis lateralis
          - Tuberositas distalis medialis
      - Ulna
        - Extremitas proximalis
          - Incisura semilunaris
          - Processus anconaeus
          - Olecranon
          - Incisura radialis
      - Ulna
        - Corpus ulnae
          - Facies medialis
          - Facies lateralis
          - Facies dorsalis
          - Margo volaris
          - Extremitas distalis
          - Capitulum ulnae
          - Processus styloideus
      - Carpus
        - Ossa carpi
          - Os carpi radiale
          - Os carpi intermedium
          - Os carpi ulnare
          - Os carpi accessorium
          - Os carpale primum
          - Os carpale secundum
          - Os carpale tertium
          - Os carpale quartum
          - Sulcus carpi
      - Metacarpus
        - Ossa metacarpalia I–V
          - Extremitas proximalis
          - Corpus
          - Extremitas distalis
        - Os metacarpale magnum
          - Tuberositas
        - Ossa metacarpalia parva
      - Phalanges digitorum manus
        - Phalanx prima
          - Extremitas proximalis
          - Corpus
          - Extremitas distalis
        - Phalanx secunda
          - Extremitas proximalis
          - Corpus
          - Extremitas distalis
        - Phalanx tertia
          - Facies articularis
          - Facies dorsalis
            - Sulcus dorsalis
            - Processus extensorius
          - Facies volaris
            - Crista semilunaris
            - Facies flexoria
            - Sulcus volaris
            - Foramen volare
          - Canalis semilunaris
          - Cartilagines phalangis tertiae

- Phalanges digitorum manus
  - Phalanx tertia
    - Facies interdigitalis
      - Foramen interdigitale
    - Margo dorsalis
    - Crista unguicularis
- Ossa sesamoidea
  - Ossa sesamoidea phalangis primae
  - Os sesamoideum phalangis tertiae (s. os naviculare)
  - Ossa sesamoidea dorsalia
  - Cartilagines sesamoideae
  - Ossa extremitatis pelvinae
- Cingulum extremitatis pelvinae
  - Os coxae
    - Os ilium
      - Corpus ossis ilium
      - Ala ossis ilium
      - Facies glutaea
        - Linea glutaea
      - Facies pelvina
        - Linea arcuata
        - Pars articularis
          - Facies articularis
        - Pars iliaca
        - Linea iliopectinea
          - Tuberculum psoadicum
      - Crista iliaca
      - Margo medialis
        - Incisura ischiadica major
        - Spina ischiadica
      - Margo lateralis
      - Tuber coxae
      - Tuber sacrale
      - Angulus acetabularis
    - Os ischii
      - Corpus ossis ischii
        - Facies pelvina
        - Facies ventralis
        - Margo medialis
          - Symphysis ischii
        - Margo lateralis
          - Incisura ischiadica minor
        - Margo cranialis
        - Margo caudalis
          - Arcus ischiadicus
        - Tuber ischiadicum
      - Ramus acetabularis
        - Spina ischiadica
- Gingulum extremitatis pelvinae
  - Os coxae
    - Os ischii
      - Ramus symphyseos
    - Os pubis
      - Corpus ossis pubis
        - Facies pelvina
        - Facies ventralis
          - Sulcus pubis
        - Pecten ossis pubis
          - Eminentia iliopectinea
          - Tuberculum pubicum
        - Ramus acetabularis
        - Ramus symphyseos
    - Os acetabuli
  - Pelvis
    - Symphysis pelvis
    - Arcus ischiadicus
    - Linea terminalis
      - Pars sacralis
      - Pars iliaca
      - Pars publica
    - Apertura pelvis cranialis
    - Apertura pelvis caudalis
    - Cavum pelvis
    - Axis pelvis
    - Conjugata
    - Diameter transversa
    - Acetabulum
      - Incisura acetabuli
      - Fossa acetabuli
      - Facies lunata
    - Foramen obturatum
    - Sulcus obturatorius
- Os femoris
  - Extremitas proximalis
    - Caput femoris
    - Fovea capitis femoris
    - Collum femoris
    - Trochanter major
    - Crista trochanterica
    - Crista intertrochanterica
    - Fossa trochanterica
  - Corpus femoris
    - Facies cranialis
    - Facies caudalis
      - Sulcus vasculosus
    - Margo medialis
      - Trochanter minor

- Os femoris
  - Corpus femoris
    - Margo medialis
      - Crista supracondyloidea medialis
    - Margo lateralis
      - Trochanter tertius
      - Fossa supracondyloidea
      - Crista supracondyloidea lateralis
  - Extremitas distalis
    - Condylus medialis
    - Condylus lateralis
    - Epicondylus medialis
    - Epicondylus lateralis
      - Fossa musculi poplitei
    - Fossa intercondyloidea
    - Fossa extensoria
    - Trochlea femoris
    - (Fovea suprapatellaris)
    - Ossa sessamoidea musculi gastrocnemii
- Tibia
  - Extremitas proximalis
    - Condylus medialis
    - Condylus lateralis
      - Facies articularis fibularis
    - Eminentia intercondyloidea
      - Tuberculum intercondyloideum mediale
      - Tuberculum intercondyloideum laterale
    - Fossae intercondyloideae
    - Incisura poplitea
    - Sulcus muscularis
    - Tuberositas tibiae
  - Corpus tibiae
    - Facies medialis
    - Facies lateralis
    - Facies plantaris
      - Lineae musculares
      - Lineae poplitea
      - Foramen nutricium
    - Margo cranialis
      - Crista tibiae
    - Margo lateralis
      - Spatium interosseum cruris
    - Margo medialis
  - Extremitas distalis
- Tibia
  - Extremitas distalis
    - Cochlea tibiae
    - Malleolus medialis
    - (Malleolus lateralis)
- Fibula
  - Corpus fibulae
    - Facies medialis
    - Facies lateralis
  - Capitulum fibulae
    - Facies articularis capituli
  - Malleolus lateralis
  - (Os malleolare)
- Patella
  - Facies articularis
  - Facies libera
  - Basis patellae
  - Apex patellae
  - Fibrocartilago patellae
- Tarsus
  - Ossa tarsi
    - Os tarsi tibiale
      - Trochlea (proximalis)
      - Facies distalis
      - Facies medialis
      - Facies lateralis
      - Facies plantaris
      - Sinus tarsi
      - Trochlea (distalis)
      - Corpus ossis tarsi tibialis
      - Caput ossis tarsi tibialis
      - Collum ossis tarsi tibialis
    - Os tarsi fibulare
      - Corpus
      - Facies medialis
      - Sustentaculum
      - Tuber calcis
      - Sulcus tuberis calcis
      - Sulcus tarsi
      - Facies lateralis
      - Margo dorsalis
      - Margo plantaris
      - Extremitas distalis
    - Os tarsi centrale
      - Facies proximalis
      - Facies distalis
      - Facies (s. margo) medialis
      - Facies (s. margo) lateralis
      - Facies (s. margo) dorsalis

- Tarsus
  - Ossa tarsi
    - Os tarsi centrale
      - Facies (s. margo) plantaris
    - Os tarsale primum
    - Os tarsale secundum
    - Os tarsale tertium
    - Os tarsale quartum
      - Sulcus musculi peronaei
- Metatarsus
  - Ossa metatarsalia I–V
    - Extremitas proximalis
- Metatarsus
  - Ossa metatarsalia I–V
    - Corpus
    - Extremitas distalis
- Phalanges digitorum pedis
  - Phalanx prima
  - Phalanx secunda
  - Phalanx tertia
    - (Vide supra)
  - Facies plantaris
  - Sulcus plantaris
  - Foramen plantare

Arthrologia

- Juncturae ossium et cartilaginum
- Synarthrosis
  - Sutura
    - Sutura serrata
    - Sutura squamosa
    - Sutura harmonia
  - Synchondrosis
  - Syndesmosis
  - Symphysis
  - Gomphosis
- Diarthrosis
  - Articulatio simplex
  - Articulatio composita
  - Arthrodia
  - Enarthrosis
  - Ginglymus
  - Articulatio trochoidea
  - Cartilago articularis
  - Cavum articulare
  - Discus articularis
  - Meniscus articularis
  - Labrum glenoidale
  - Capsula articularis
    - Stratum fibrosum
    - Stratum synoviale
  - Plica synovialis
  - Villi synoviales
  - Synovia
  - Ligamentum
- Ligamenta culumnae vertebralis et cranii
  - Fibrocarilagines intervertebrales
    - Annulus fibrosus
    - Nucleus pulposus
- Ligamenta culumnae vertebralis et cranii
  - Ligg. flava
  - Capsulae articulares
  - Ligg. intertransversaria
  - Lig. interspinalia
  - Lig. supraspinale
  - Lig. nuchae
    - Bursa supraatloidea
    - Bursa supraspinata
  - Lig. longitudinale dorsale
  - Lig. longitudinale ventrale
  - Articulationes intertransversariae
- Articulatio atlantooccipitalis
  - Capsulae articulares
  - Membrana atlantooccipitalis dorsalis
  - M. atlantooccipitalis ventralis
  - Lig. laterale
- Articulatio atlantoaxialis
  - Capsula articularis
  - Lig. dentis internum
  - Lig. dentis externum
  - Lig. transversum atlantis
- Articulationes costovertebrales
  - Articulatio capitulorum
  - Capsula articularis
  - Lig. capituli costae radiatum
  - Lig. colli costae
  - Lig. conjugale
- Articulationes costotransversariae
  - Capsula articularis
  - Lig. costotransversarium dorsale
  - Ligg. intercostalia

- Articulationes sternocostales
  - Capsula articularis
  - Lig. sternocostale radiatum
- Articulationes costochondrales
  - Capsula articularis
  - Ligg. interchondralia
  - Lig. chondroxiphoideum
- Synchondroses intersternales
  - Lig. sterni proprium internum
  - Lig. sterni proprium externum
- Articulatio intersternalis
  - Capsula articularis
- Articulatio mandibularis
  - Capsula articularis
  - Discus articularis
  - Lig. laterale
  - Lig. aborale
  - Synchondrosis temporohyoidea
  - Articulationes hyoidea

  - A. scapulohumeralis
    - Capsula articularis
  - Articulatio cubiti
  - Capsula articularis
  - Lig. collaterale mediale
  - Lig. collaterale laterale
  - Lig. annulare radii
  - Lig. obliquum
  - Lig. olecrani
- Articulatio radioulnaris proximalis
- Articulatio radioulnaris distalis
  - Capsula articularis
  - Ligg. transversa ulnae et radii
  - Lig. interosseum antibrachii
- Articulationes carpi
  - Articulatio antibrachiocarpea
  - Articulatio intercarpea
  - Articulatio carpometacarpea
  - Articulationes interosseae
  - Capsula articularis
    - Lig. carpi collaterale mediale
    - Lig. carpi collaterale laterale
    - Lig. carpi dorsale
    - Lig. carpi volare
  - Lig. radiocarpeum dorsale
  - Lig. radiocarpeum volare
  - Ligg. intercarpea dorsalia
  - Lig. intercarpea volaria
  - Lig. intercarpea interossea
- Articulationes carpi
  - Lig. carpometacarpea dorsalia
  - Lig. carpometacarpea volaria
- Articulatio ossis accessorii
  - Ligg. ossis accessorii
- Articulationes intermetacarpeae
  - Ligg. basium dorsalia
  - Ligg. basium volaria
  - Lig. intermetacarpea interossea
- Articulationes metacarpophalangeae
  - Capsulae articulares
  - Ligg. collateralia
  - Ligg. transversa
  - Ligg. intersesamoidea
  - Ligg. sesamoidea collateralia
  - Ligg. sesamoidea volaria
    - Lig. sesamoideum rectum
    - Ligg. sesamoidea obliqua
    - Lig. sesamoidea cruciata
    - Lig. sesamoidea brevia
    - Lig. phalangosesamoidea
  - Ligg. interdigitalia
- Articulationes interphalangeae proximales
  - Capsulae articulares
  - Ligg. collateralia
  - Ligg. volaria
- Articulationes interphalangeae distales
  - Capsulae articulares
    - Lig. phalangosesamoideum
  - Ligg. collateralia
  - Ligg. sesamoidea collateralia
  - Ligg. dorsalia
  - Ligg. interdigitalia cruciata

  - Ligg. cinguli extremitatis pelvinae
    - Lig. iliolumbale
    - Lig. sacroischiadicum
    - Lig. sacrotuberosum
    - Foramen ischiadicum majus
    - Foramen ischiadicum minus
- Symphysis pelvis
  - Lamina fibrocartilaginea
  - Lig. arcuatum ischiadicum
- Articulatio sacroiliaca
  - Capsula articularis
  - Lig. sacroiliacum ventrale
  - Lig. sacroiliacum dorsale

- Articulatio sacroiliaca
  - Lig. sacroiliacum laterale
- Articulatio coxae
  - Capsula articularis
  - Labrum glenoidale
  - Lig. transversum acetabuli
  - Lig. teres femoris
  - Lig. accessorium
- Articulatio genu
  - Articulatio femoropatellaris
    - Capsula articularis
    - Lig. femoropatellare mediale
    - Lig. femoropatellare laterale
    - Ligg. patellae (laterale, intermedium, mediale)
  - Articulatio femorotibialis
    - Capsula articularis
    - Lig. collaterale mediale
    - Lig. collaterale laterale
    - Meniscus medialis
    - Meniscus lateralis
    - Lig. tibiale anterius menisci medialis
    - Lig. tibiale anterius menisci lateralis
    - Lig. tibiale posterius menisci medialis
    - Lig. tibale posterius menisci lateralis
    - Lig. femorale menisci lateralis
- Articulatio tibiofibularis
  - Capsula articularis
- Lig. interosseum cruris
- Syndesmosis tibiofibularis
  - Capsula articularis
  - Lig. malleoli lateralis dorsalis
  - Lig. malleoli lateralis plantaris
- Articulationes tarsi
  - Articulatio talocruralis
  - Articulationes intertarseae
  - Articulatio tarsometatarseae
  - Capsula articularis
- Articulationes tarsi
  - Lig. collaterale mediale longum
  - Lig. collaterale mediale breve
  - Lig. collaterale laterale longum
  - Lig. collaterale laterale breve
  - Ligg. tarsi dorsalia
  - Ligg. tarsi plantaria
    - Lig. plantare longum
  - Ligg. tarsi interossea
  - Ligg. tarsometatarsea dorsalia
  - Ligg. tarsometatarsea plantaria
  - Ligg. tarsometatarsea interossea
- Articulationes intermetatarseae
  - Ligg. basium dorsalia
  - Ligg. basium plantaria
  - Ligg. intermetatarsea interossea
- Articulationes metatarsophalangeae
  - Capsulae articulares
  - Ligg. collateralia
  - Ligg. transversa
  - Ligg. intersesamoidea
  - Ligg. sesamoidea collateralia
  - Ligg. sesamoidea plantaria
    - Lig. sesamoideum rectum
    - Ligg. sesamoidea obliqua
    - Ligg. sesamoidea cruciata
    - Ligg. sesamoidea brevia
    - Ligg. phalangosesamoidea
  - Ligg. interdigitalia
- Articulationes interphalangeae proximales
  - Capsules articulares
  - Ligg. collateralia
  - Ligg. plantaria
- Articulationes interphalangeae distales
  - Capsulae articulares
    - Lig. phalangosesamoideum
    - Ligg. collateralia
    - Ligg. sesamoidea collateralia
    - Ligg. dorsalia
    - Ligg. interdigitalia cruciata

MYOLOGIA

- Musculus
  - Caput
  - Venter
  - Cauda
- M. fusiformis
- M. unipennatus
- M. bipennatus
- M. sphincter

- M. orbicularis
- M. articularis
- M. skeleti
- M. cutaneus
  - M. cutaneus faciei
  - M. cutaneus colli
  - M. cutaneus trunci
  - M. cutaneus omobrachialis
- M. frontalis
- M. occipitalis
- Tendo
- Aponeurosis
- Perimysium
- Fascia
  - Fascia superficialis
  - Fascia profunda
  - Septum intermusculare
- Inscriptio tendinea
- Arcus tendineus
- Ligamentum vaginale
- Vagina fibrosa tendinis
- Retinaculum tendinis
- Vagina synovialis tendinis
  - Mesotenon
- Trochlea muscularis
- Bursa synovialis
- Origo
- Insertio

FASCIAE et MUSCULI CAPITIS

- Fascia temporalis
- Fascia buccalis
- Fascia masseterica
- Fascia parotidea
- Fascia pharyngea

- Musculi labiorum et buccarum
  - M. cutaneus labiorum
  - M. orbicularis oris
  - M. levator nasolabialis
  - M. levator labii superioris proprius
  - M. zyomaticus
  - M. incisivus superior
  - M. incisivus inferior
  - M. mentalis
  - M. depressor labii inferioris
  - M. buccinator
- Musculi narium
- Musculi narium
  - M. dilatator naris lateralis
  - M. transversus nasi
  - M. lateralis nasi
  - M. dilatator naris apicalis
  - M. levator rostri
  - M. depressor rostri
- Musculi palpebrarum
  - M. orbicularis oculi
  - M. corrugator supercilii
  - M. levator palpebrae superioris
  - M. malaris
- Musculi mandibulae
  - M. masseter
  - M. temporalis
  - M. pterygoideus lateralis
  - M. pterygoideus medialis
  - M. occipitomandibularis
  - M. digastricus
- Musculi ossis hyoidei
  - M. transversus mandibulae
    - Pars accessoria
  - M. stylohyoideus
  - M. occipitohyoideus
  - M. geniohyoideus
  - M. keratohyoideus
  - M. hyoideus transversus
- Fasciae et musculi oculi
  - Fascia orbitalis
    - Fascia superficialis
    - Fascia profunda
  - Fascia bulbi
  - Musculi recti oculi
    - M. rectus oculi dorsalis
    - M. rectus oculi ventralis
    - M. rectus oculi medialis
    - M. rectus oculi lateralis
    - M. retractor oculi
  - M. obliquus oculi dorsalis
  - M. obliquus oculi ventralis
- Musculi suriculae
  - M. scutaris
  - M. zygomaticoauricularis
  - M. scutoauricularis superficialis oralis
  - M. scutoauricularis superficialis intermedius

- Musculi suriculae
  - M. scutoauricularis superficialis aboralis
  - M. scutoauricularis superficialis accessorius
  - M. parietoauricularis
  - M. cervicoauricularis superficialis
  - M. cervicoauricularis intermedius
  - M. cervicoauricularis profundus
  - M. parotidoauricularis
  - M. scutoauricularis profundus major
  - M. scutoauricularis profundus minor
  - M. tragicus
  - M. antitragicus
  - M. helicis
  - M. verticalis auriculae

FASCIAE et MUSCULI COLLI

- Fascia colli superficialis
- Fascia colli profunda
- Fascia propria tracheae
- M. sternocephalicus
- M. sternomandibularis
- M. sternomastoideus
- M. omohyoideus
- M. scalenus
  - M. scalenus dorsalis
  - M. scalenus ventralis
- M. rectus capitus ventralis major
- M. rectus capitus ventralis minor
- M. rectus capitis lateralis
- M. longus colli
- Mm. intertransversarii colli
- M. trapezius cervicalis
- M. rhomdoideus cervicalis
- M. splenius
- M. longissimus capitis
- M. longissimus atlantis
- M. semispinalis cervicis
- M. complexus
- M. interspinalis cervicis
- M. multifidus cervicis
- M. obliquus capitis caudalis
- M. obliquus capitis cranialis
- M. rectus capitis dorsalis major
- M rectus capitis dorsalis minor

FASCIAE et MUSCULI DORSI et LUMBORUM

- Fascia lumbodorsalis
- M. serratus dorsalis cranialis
- M. serratus dorsalis caudalis
- M. longissimus costarum
- M. longissimus dorsi
- M. spinalis dorsi
- M. semispinalis dorsi
- Mm. interspinales dorsi
- M. multifidus dorsi
- M. intertransversarii lumborum

FASCIA et MUSCULI CAUDAE

- Fascia coccygea
- M. sacrococcygeus dorsalis
- M. sacrococcugeus lateralis
- M. sacrococcygeus ventralis
- M. ischiococcygeus
- Mm. intertransversarii caudae

Musculi thoracis

- Mm. levatores costarum
- Mm. intercostales interni
- Mm. intercostales externi
- M. retractor costae
- M. rectus thoracis
- M. transversus thoracis
- M. diaphragma
  - Pars costalis
  - Pars sternalis
  - Pars lumbalis
    - Crus dextrum
    - Crus sinistrum
  - Centrum tendineum
  - Hiatus aorticus
  - Hiatus oesophagus
  - Foramen venae cavae

FASCIAE et MUSCULI ABDOMINIS

- Tunica abdominis
- Linea alba
- Umbilicus

M. obliquus abdominis externus

- Aponeurosis
- Lamina inguinalis
- Lamina femoralis
- Lamina iliaca
- Annulus inguinalis externus

- M. obliquus abdominis externus
  - Annulus inguinalis internus
  - Canalis inguinalis
- M. obliquus abdominis internus
- M. cremaster
- M. rectus abdominis
- M. transversus abdominis
  - Tendo praepubicus

Fasciae et musculi extremitatis thoracicae

Musculi cinguli extremitatis thoracicae

- M. trapezius
  - M. trapezius cervicalis
  - M. trapezius thoracalis
- M. omotransversarius
- M. brachiocephalicus
- M. rhomboideus
  - M. rhomboideus cervicalis
  - M. rhomboideus thoracalis
- M. latissimus dorsi
- Fascia pectoralis
- M. pectoralis superficialis
  - Pars descendens
  - Pars transversa
- M. pectoralis profundus
  - Pars scapularis
  - Pars humeralis
- M. serratus ventralis
  - M. serratus cervicis
  - M. serratus thoracis

Musculi omi

- Fascia omobrachialis
- Fascia subscapularis
- M. supraspinatus
- M. infraspinatus
- M. teres minor
- M. subscapularis
- M. teres major
- M. coracobrachialis
- M. capsularis omi

Musculi brachii

- M. biceps brachii
- M. brachialis
- M. tensor fasciae antibrachii

Musculi brachii

- M. triceps brachii
  - Caput longum
  - Caput laterale
  - Caput mediale
  - Caput profundum
- M. anconaeus

Fasciae et musculi antibrachii et manus

- Fascia antibrachii
- Fascia carpea
  - Lig. carpi transversum
- Fascia metacarpea
- Fascia digitalis
- M. extensor carpi radialis
- M. extensor carpi ulnaris
- M. extensor carpi obliquus
- M. extensor digitalis communis
- M. extensor digitalis lateralis
- M. extensor digitalis medialis
- M. extensor digiti secundi
- M. extensor digiti quarti
- M. extensor digiti quinti
- M extensor digiti primi et secundi
- M. extensor digiti tertii et quarti
- M. flexor carpi lateralis
- M. flexor carpi intermedius
- M. flexor carpi medialis
- M. flexor digitalis superficialis
- M. flexor digitalis profundus
- M. abductor digiti primi brevis
- M. flexor digiti primi brevis
- M. adductor digiti primi
- M. adductor digiti secundi
- M. adductor digiti quinti
- M. flexor digiti quinti
- M. abductor digiti quinti
- M. palmaris brevis
- M. palmaris longus accessorius
- Mm. lumbricales
- Mm. interossei
- M. brachioradialis
- M. supinator
- M. pronator teres
- M. pronator quadratus

FASCIAE et MUSCULI CINGULI EXTREMITATIS PELVINAE
- Fascia iliaca
- Fascia pelvis
- Fascia perinei
- Fascia glutaea
- M. psoas major
- M. psoas minor
- M. iliacus
- M. quadratus lumborum
- Mm. intertransversarii lumborum
- M. tensor fasciae latae
- M. glutaeus superficialis
- M. glutaeus medius
- M. glutaeus profundus
- M. biceps femoris
- M. abductor cruris caudalis
- M. semitendinosus
- M. semimembranosus

Fasciae et musculi femoris
- Fascia lata
- Fascia femoralis medialis
- M. sartorius
- M. gracilis
- M. pectineus
- M. adductor
- M. quadratus femoris
- M. obturator externus
- M. obturator internus
- M. gemellus
- M. piriformis
- M. quadriceps femoris
  - M. rectus femoris
  - M. vastus lateralis
  - M. vastus intermedius
  - M. vastus medialis
- M. articularis genu
- M. capsularis coxae

FASCIA et MUSCULI CRURIS et PEDIS
- Fascia cruris
- Fascia tarsi
  - Lig. transversum tarsi
- Fascia metatarsea
- Fascia digitalis
- M. extensor digitalis longus
- M. extensor digitalis medialis
- M. extensor digitalis lateralis
- M. extensor digiti primi longus

FASCIA et MUSCULI CRURIS et PEDIS
- M. tibialis dorsalis
- M. peroneus longus
- M. peroneus brevis
- M. peroneus tertius
- Tendo femorometatarseus
- M. gastrocnemius
- M. soleus
- M. popliteus
- M. flexor digitalis superficialis
- M. flexor digitalis profundus
  - M. tibialis plantaris
  - M. flexor digitalis longus
  - M. flexor digiti primi
- M. extensor digitalis brevis
- M. adductor digiti secundi
- M. adductor digiti quinti
- M. quadratus plantae
- M. abductor digiti quinti
- M. abductor digiti primi
- M. adductor digiti primi
- M. flexor digiti primi brevis

Bursae et vaginae synoviales
- Bursa synovialis subcutanea
- B. synovialis submuscularis
- B. synovialis subfascialis
- B. synovialis subtendinea
- B. synovialis tendinis
- B. m. tensoris palati
- V. t. m. digastrici
- B. m. longi colli
- B. t. m. infraspinati
- B. t. m. teretis minoris
- B. t. m. subscapularis
- V. t. m. coracobrachialis
- B. intertuberalis
- B. subtendinea olecrani
- V. t. m. extensoris carpi radialis
- B. t. m. extensoris carpi radialis
- V. t. m. extensoris carpi ulnaris
- V. t. m. extensoris digitalis communis
- V. t. m. extensoris digitalis lateralis
- V. t. m. extensoris digitalis medialis
- B. t. m. extensoris digitalis communis
- V. t. m. extensoris digiti secundi

- Bursae et vaginae synoviales
  - V. t. m. extensoris digiti quarti
  - V. t. m. extensoris digiti quinti
  - V. t. m. extensoris digiti primi et secunda
  - V. t. m. extensoris digiti tertii et quarti
  - V. t. m. extensoris carpi obliqui
  - V. t. m. flexoris carpi medialis
  - V. t. m. flexoris carpi lateralis
  - V. carpea
  - V. digitalis
  - B. podotrochlearis
  - B. trochanterica
  - B. t. m. bicipitis femoris proximalis
  - B. t. m. bicipitis femoris distalis
  - B. t. m. semitendinosi
  - B. t. m. obturatorii interni
  - B. t. m. recti femoris
  - B. t. m. vasti lateralis
  - V. t. m. extensoris digitalis longi

- Bursea et vaginea synoviales
  - B. t. m. extensoris digitalis longi
  - V. t. m. extensoris digitalis lateralis
  - V. t. m. extensoris digitalis medialis
  - V. t. m. peronaei longi
  - V. t. m. extensoris digiti quarti
  - V. t. m. peronaei tertii
  - V. t. m. extensoris digiti tertii
  - V. t. m. extensoris digiti primi longi
  - V. t. m. flexoris digiti primi brevis
  - V. t. m. tibialis dorsalis
  - B. t. m. tibialis dorsalis
  - B. t. m. gastrocnemii
  - B. calcenea subtendinea
  - B. calcanea subcutanea
  - V. tarsea
  - V. digitalis
  - B. podotroclearis
  - V. t. m. flexoris digitalis longi

SPLANCHNOLOGIA

- Tunica albuginea
- Tunica fibrosa
- Tunica adventitia
- Tunica mucosa
  - Lamina propria mucosae
  - Lamina muscularis mucosae
  - Tela submocosa
  - Plica mucosa
  - Mucus
- Tunica muscularis
- Tunica serosa
  - Tela subserosa
  - Plica serosa
- Tunica serosa
  - Ligamentum serosum
  - Serum
- Epithelium
- Endothelium
- Organon parenchymatosum
  - Parenchyma
  - Stroma
- Glandula
- Lobus
- Lobulus
- Glandula mucosa
- Musculus viscerum

Apparatus digestorius

- Cavum oris
  - Bucca
  - Vestibulum oris
  - Cavum oris proprium
  - Rima oris
  - Labia oris

- Cavum oris
  - Labia oris
    - Labium superius
    - Labium inferius
  - Commissura labiorum
  - Angulus oris

- Cavum oris
  - Mentum
  - Philtrum
  - Palatum
    - Palatum durum
    - Palatum molle
  - Raphe palati
  - Rugae palatinae
  - Papilla incisiva
  - Ductus incisivus
- Tunica mucosa oris
  - Frenulum labii superioris
  - Frenulum labii inferioris
  - Gingiva
  - Caruncula sublingualis
  - Plica sublingualis
  - Plica pterygomandibularis
  - Lig. pterygomandibulare
- Glandulae oris
  - Gl. labiales
  - Gl. buccales superiores
  - Gl. buccales inferiores
  - Gi. buccales intermediae
  - Gl. palatinae
  - Gl. linguales
  - Gl. salivales
  - Gl. sublingualis
  - Gl. sublingualis grandicanalaris
  - Gl. sublingualis parvicanalaris
  - Ductus sublingualis major
  - Ductus sublinguales minores
  - Gl. mandibularis
  - Ductus mandibularis
  - Gl. parotis
  - Ductus parotideus
  - Papilla salivalis
  - Gl. parotis accessoria
  - Gl. zygomatica
  - Ductus glandulae zygomaticae major
  - Ductus glandulae zygomaticae minores
  - Saliva
- Dentes
  - Corona dentis
    - Tubercula (coronae) dentis
  - Collum dentis
  - Radix (Radices) dentis
  - Apex radicis dentis
- Dentes
  - Facies masticatoria
  - Facies lingualis
  - Facies labialis
  - Facies buccalis
  - Facies contactus
  - Cavum dentis
  - Pulpa dentis
  - Canalis radicis dentis
  - Foramen apicis dentis
  - Substantia eburnea
  - Substantia adamantina
  - Substantia ossea
  - Canaliculi dentales
  - Spatia interglobularia
  - Prismata adamantina
  - Cuticula dentis
  - Periosteum alveolare
  - Arcus dentalis superior
  - Arcus dentalis inferior
  - Dentes incisivi
  - Dentes canini
  - Dentes praemolares
  - Dentes molares
  - Dens sectorius
  - Dentes permanentes
  - Dentes decidui
- Lingua
  - Radix linguae
  - Corpus linguae
  - Apex linguae
  - Dorsum linguae
  - Facies ventralis
  - Facies lateralis
  - Margo lateralis
  - Tunica mucosa linguae
  - Frenulum linguae
  - Plica glossoepiglottica
  - Papillae linguales
  - Papillae filiformes
  - Papillae conicae
  - Papillae fungiformes
  - Papillae lenticulares
  - Papillae vallatae
  - Papillae foliatae
  - Sulcus medianus linguae
  - Septum linguae
  - Folliculi linguales
  - Lyssa

- Lingua
  - Musculi linguae
    - M. genioglossus
    - M. hyoglossus
    - M. styloglossus
    - M. longitudinalis linguae
    - M. transversus linguae
    - M. verticalis linguae
- Fauces
  - Isthmus faucium
  - Velum palatinum
  - Uvula (palatina)
  - Arcus palatinus
  - Arcus glossopalatinus
  - Arcus pharyngopalatinus
  - Tonsilla palatina
    - Folliculi tonsillares
    - Fossulae tonsillares
  - Sinus tonsillaris
  - Tonsilla paraepiglottica
  - Musculi palati
    - M. levator palati
    - M. tensor palati
    - M. palatinus
- Pharynx
  - Cavum pharyngis
  - Fornix pharyngis
  - Pars nasalis pharyngis
  - Pars oralis pharyngis
  - Pars laryngea pharyngis
  - Ostium pharyngeum tubae
  - Torus tubarius
  - Plica salpingopharyngea
  - Recessus pharyngeus
  - Recessus piriformis
  - Diverticulum pharyngeum
  - Fascia pharyngea
  - Tunica mucosa
    - Glandulae pharyngeae
    - Tonsilla pharyngea
  - Tela submucosa
  - Raphé pharyngis
  - Musculi pharyngis
    - M. stylopharyngeus
    - M. palatopharyngeus
    - M. pterygopharyngeus
    - M. hyopharyngeus
    - M. thyreopharyngeus
    - M. cricopharyngeus
- Oesophagus
  - Pars cervicalis
  - Pars thoracalis
  - Pars abdominalis
  - Aditus oesophagi
  - Tunica adventitia
  - Tunica muscularis
  - M. cricooesophageus
  - M. thyreooesophageus
  - Tela submucosa
  - Tunica mucosa
    - Lamina muscularis mucosae
  - Glandulae oesophageae
- Ventriculus
  - Facies parietalis
  - Facies viseralis
  - Curvatura ventriculi major
  - Curvatura ventriculi minor
  - Saccus caecus
  - Cardia
  - Pylorus
  - Fundus ventriculi
  - Corpus ventriculi
  - Pars pylorica
  - Pars oesophagea
  - Pars glandularis
  - Diverticulum ventriculi
  - Antrum pyloricum
- Proventriculi
- Atrium ventriculi
- Rumen
  - Facies parietalis
  - Facies visceralis
  - Curvatura dorsalis
  - Curvatura ventralis
  - Extremitas cranialis
  - Extremitas caudalis
  - Saccus ruminis dorsalis
  - Saccus ruminis ventralis
  - Saccus caecus ruminis dorsalis
  - Saccus caecus ruminis ventralis
  - Sulcus longitudinalis dexter
  - Sulcus accessorius dexter
  - Sulcus longitudinalis sinister
  - Sulcus coronarius dorsalis
  - Sulcus coronarius ventralis
  - Sulcus caudalis
  - Sulcus cranialis
  - Sulcus ruminoreticularis

- Reticulum
  - Facies parietalis
  - Facies ruminalis
  - Curvatura major
  - Curvatura minor
  - Fundus recticuli
- Omasum
  - Facies parietalis
  - Facies visceralis
  - Curvatura major
  - Curvatura minor
  - Collum omasi
- Abomasum
  - Facies parietalis
  - Facies visceralis
  - Curvatura major
  - Curvatura minor
  - Fundus abomasi
  - Corpus abomasi
  - Pars pylorica
  - Sulcus oesophageus
- Ostium ruminoreticulare
- Ostium reticuloomasicum
- Ostium omasoabomasicum
- Pilae ruminis
  - Pila cranialis
  - Pila caudalis
  - Pila dexter
  - Pila sinister
  - Pila ruminoreticularis
- Papillae ruminis
- Cellulae reticuli
- Papillae reticuli
- Papillae unguliformes
- Laminae omasi
- Recessus interlaminares
- Papillae omasi
- Sulcus omasi
- Plicae terminales omasi
- Ansa muscularis omasoabomasica
- Plicae spirales abomasi
- Torus pyloricus
- Tunica serosa
- Tunica muscularis
  - Stratum longitudinale
  - Stratum circulare
  - M. sphincter cardiae
  - M. sphincter pylori
  - Fibrae obliquae
- Valvula pylori
- Valvula cardiae
- Tela submucosa
- Tunica mucosa
  - Lamina mucularis mucosae
  - Margo plicatus
  - Areae gastricae
  - Foveolae gastricae
- Gl. cardiacae
- Gl. funducae
- Gl. pyloricae
- Noduli lymphatici gastrici
- Succus gastricus
- Intestitum tenue
  - Duodeum
    - Pars prima duodeni
      - Ampulla duodeni
      - Ansa sigmoidea
    - Flexura duodeni primi
    - Pars secunda duodeni
    - Flexura duodeni secunda
    - Pars tertia
    - Flexura duodenojejunalis
  - Intestinum tenue mesenteriale
    - Intestinum jejunum
    - Intestinum ileum
  - Tunica serosa
  - Tunica muscularis
    - Stratum longitudinale
    - Stratum circulare
    - Sphincter ilei
  - Tela submucosa
  - Tunica mucosa
    - Lamina muscularis mucosae
    - Plicae circulares
    - Diverticulum duodeni
    - Papilla duodeni
    - Villi intestinales
    - Gl. intestinales
    - Gl. duodenales
    - Noduli lymphatici solitarii
    - Noduli lymphatici aggregati
    - Succus entericus
    - Chymus
    - Chylus
- Intestinum crassum
  - Intestinum caecum
    - Basis caeci
    - Corpus caeci

- Intestinum crassum
  - Intestinum caecum
    - Basis caeci
    - Corpus caeci
    - Apex caeci
    - Curvatura caeci major
    - Curvatura caeci minor
    - Taeniae caeci
    - Haustra caeci
    - Plicae semilunares caeci
    - Ostium ileocaecale
    - Valvula ileocaecalis
    - Ostium caecocolicum
    - Valvula caecocolica
  - Colon
    - Colon crassum
    - Colon tenue
    - Colon ventrale dextrum
    - Flexura coli sternalis
    - Colon ventrale sinistrum
    - Flexura coli pelvina
    - Colon dorsale sinistrum
    - Flexura coli diaphragmatica
    - Colon dorsale dextrum
    - Ansae coli
    - Ansa spiralis coli
    - Gyri coli
    - Colon dextrum
    - Colon transversum
    - Colon sinistrum
    - Ostium ileocolicum
    - Taeniae coli
    - Haustra coli
    - Plicae semilunares coli
  - Intestinum rectum
    - Ampulla recti
    - Pars recti peritonealis
    - Pars recti retroperitonealis
  - Anus
  - Tunica serosa
  - Appendices epiploicae
  - Tunica muscularis
    - Stratum longitudinale
    - Stratum circulare
    - M. sphincter caeci
    - M. sphincter ani internus
    - M. rectococcygeus
    - M. sphincter ani externus
    - M. retractor ani
    - Lig. suspensorium ani
- Tela submucosa
- Intestinum crassum
  - Tunica mucosa
    - Lamina muscularis mucosae
    - Glandulae intestinales
    - Noduli lymphatici solitarii
  - Gl. anales
  - Gl. circumanales
  - Sinus anales
- Hepar
  - Facies parietalis
  - Facies visceralis
  - Margo dorsalis
  - Margo ventralis
  - Margo dexter
  - Margo sinister
  - Incisura umbilicalis
  - Incisurae interlobares
  - Fossa venae cavae
  - Fossa vesicae felleae
  - Porta hepatis
  - Lobus hepatis dexter
  - Lobus hepatis sinister
  - Lobus hepatis medius
  - Lobus hepatis quadratus
  - Lobus hepatis dexter lateralis
  - Lobus hepatis dexter medialis
  - Lobus hepatis sinister lateralis
  - Lobus hepatis sinister medialis
  - Lobus hepatis caudatus
    - Processus caudatus
    - Processus papillaris
  - Impressio oesophagea
  - Impressio gastrica
  - Impressio duodenalis
  - Impressio colica
  - Impressio caecalis
  - Impressio renalis
  - Impressio reticularis
  - Impressio omasica
  - Impressio abomasica
  - Lig. teres hepatis
  - Lig. falciforme hepatis
  - Lig. dextrum hepatis
  - Lig. sinistrum hepatis
  - Lig. coronarium hepatis
  - Lig. hepatorenale
  - Tunica serosa
  - Capsula fibrosa
  - Lobuli hepatis

- Hepar
    - Rami arteriosi interlobulares
    - Venae interlobulares
    - Venae centrales
    - Ductus biliferi
    - Ductus interlobulares
    - Ductus hepaticus
    - Vesica fellea
        - Fundus vesicae felleae
        - Corpus vesicae felleae
        - Collum vesicae felleae
        - Tunica serosa vesicae felleae
        - Tunica muscularis vesicae felleae
        - Tunica mucosa vesicae felleae
    - Ductus cysticus
    - Ductus choledochus
    - Ductus hepatocystici
    - Gl. mucosae biliosae
- Pancreas
    - Facies dorsalis
    - Facies ventralis
    - Margo dexter
    - Margo sinister
    - Margo caudalis
    - Angulus cranialis
    - Angulus dexter
    - Angulus sinister
- Pancreas
    - Incisura pancreatis
    - Annulus pancreatis
    - Lobus pancreatis dexter
    - Lobus pancreatis sinister
    - Caput pancreatis
    - Ductus pancreaticus
    - Ductus pancreaticus accessorius
    - Succus pancreaticus
- Lien
    - Facies parietalis
    - Facies visceralis
        - Facies gastrica
        - Facies intestinalis
        - Facies renalis
    - Extremitas dorsalis
    - Extremitas ventralis
    - Margo cranialis
    - Margo caudalis
    - Hilus lienis
    - Tunica serosa
    - Tunica albuginea
    - Trabeculae lienis
    - Pulpa lienis
    - Noduli lymphatici lienales
    - (Lien accessorius)

APPARATUS RESPIRATORIUS

- Cavum nasi
    - Nares
    - Alee nasi
    - Rostrum
    - Planum rostrale
    - Planum nasolabiale
    - Planum nasale
    - Diverticulum nasi
    - Vestibulum nasi
    - Ostium nasolacrimale
    - Septum nasi
        - Septum cartilagineum
        - Septum membranaceum
    - Meatus nasi
        - Meatus nasi dorsalis
        - Meatus nasi medius
        - Meatus nasi ventralis
        - Meatus nasi communis
        - Meatus nasopharyngeus
        - Meatus ethmoidales
- Cavum nasi
    - Meatus nasi
        - Aditus nasomaxillaris
    - Fundus cavi nasi
    - Choanae
    - Membrana mucosa nasi
        - Plica alaris
        - Regio respiatoria
        - Regio olfactoria
        - Gl. nasales
        - Gl. olfactoriae
        - Plexus cavernosi nasi
    - Sinus paranasales
        - Sinus maxillaris
            - Septum sinus maxillaris
        - Sinus frontalis
        - Septum sinuum frontalium
        - Sinus palatinus
        - Sinus sphenoidalis
        - Sinus sphenopalatinus

- Cavum nasi
  - Sinus paranasales
    - Sinus lacrimalis
    - Ostium frontomaxillare
    - Ostia frontonasalia
    - Ostium palatomaxillare
  - Cartilagines nasi
    - Cartilago septi nasi
    - Cartilagines alares
    - Cartilagines parietales
    - Cartilagines accessoriae
  - Os rostri
  - Organon vomeronasale
  - Cartilago vomeronasalis
  - Ductus vomeronasalis
- Larynx
  - Cartilagines laryngis
    - Cartilago thyreoidea
      - Lamina (dextra, sinistra)
      - Corpus
      - Prominentia laryngea
      - Incisura thyreoidea
      - Linea obliqua
      - Cornu orale
      - Facies articularis hyoidea
      - Fissura thyreoidea
      - Foramen thyreoideum
      - Cornu aborale
      - Facies articularis cricoidea
  - Cartilago cricoidea
    - Arcus
    - Lamina
    - Facies articularis arytaenoidea
    - Facies articularis thyreoidea
    - Crista mediana
  - Cartilago arytaenoidea
    - Facies medialis
    - Facies lateralis
    - Facies dorsalis
    - Processus muscularis
    - Processus vocalis
    - Basis
    - Facies articularis
    - Apex
    - Cartilago corniculata
  - Cartilago interarytaenoidea
  - Cartilago epiglottica
    - Facies oralis
- Larynx
  - Cartilago epiglottica
    - Facies aboralis
    - Margines laterales
      - Basis
      - Apex
    - Cartilago cuneiformis
    - Tuberulum cuneiforme
  - Ligamenta et articulationes laryngis
    - Articulatio hyothyreoidea
      - Capsula articularis hyothyreoidea
      - Membrana hyothyreoidea
    - Articulatio cricothyreoidea
      - Capsula articularis cricothyreoidea
      - Membrana cricothyreoidea
    - Articulatio cricoarytaenoidea
      - Capsula articularis cricoarytaenoidea
    - Lig. arytaenoideum transversum
    - Membrana cricotrachealis
    - Lig. hyoepiglotticum
    - Lig. thyreoepiglotticum
    - Lig. ventriculare
    - Lig. vocale
    - Lig. aryepiglotticum
    - Lig. thyreoarytaenoideum
    - Lig. arycorniculatum
  - Musculi laryngis
    - M. cricothyreoideus
    - M. cricoarytaenoideus dorsalis
    - M. cricoarytaenoideus lateralis
    - M. arytaenoideus transversus
    - M. thyreoarytaenoideus
    - M. ventricularis
    - M. vocalis
    - M. hyoepiglotticus
  - Cavum laryngis
    - Aditus laryngis
    - Vestibulum laryngis
    - Plica ventricularis
    - Ventriculus laryngis lateralis
      - Sacculus laryngis
    - Ventriculus laryngis medianus
    - Labium vocale
    - Glottis

- Larynx
  - Cavum laryngis
    - Rima glottidis
      - Pars intermembranacea
      - Pars intercartilaginea
    - Tunica mucosa laryngis
    - Plica aryepiglottica
    - Plica vocalis
    - Incisura interarytaenoidea
    - Gl. laryngeae
    - Noduli lymphatici laryngei
- Trachea
  - Pars cervicalis
  - Pars thoracalis
  - Cartilagines tracheales
  - Ligg. annularia
  - Lig. transversum
  - Paries membranacea
  - Bifurcatio tracheae
  - Tunica muscularis
  - Tela submucosa
  - Tunica mucosa
    - Gl. tracheales
- Bronchi
  - Bronchus dexter
  - Bronchus sinister
  - Bronchus apicalis
  - Rami bronchiales
  - Cartilagines bronchiales
  - Tunica muscularis
  - Tela submucosa
  - Tunica mucosa
    - Gl. bronchiales
    - Noduli lymphatici bronchiales
- Pulmones
  - Pulmo dexter
  - Pulmo sinister
  - Facies costalis
  - Facies mediastinalis
  - Facies diaphragmatica
  - Margo dorsalis
  - Margo ventralis
  - Margo basalis
  - Basis pulmonis
  - Apex pulmonis
  - Hilus pulmonis
  - Radix pulmonis
  - Incisura cardiaca
  - Incisura interlobares
  - Lobus apicalis
- Pulmones
  - Lobus cardiacus
  - Lobus diaphragmaticus
  - Lobus intermedius
  - Impressio cardiaca
  - Impressio aortica
  - Impressio oesophagea
  - Impressio tracheae
  - Impressio venae cavae cranialis
  - Impressio venae cavae caudalis
  - Impressio venae azygos
  - Lobuli pulmonum
  - Rami bronchiales
  - Bronchioli
  - Bronchioli respiratorii
  - Ductuli alveolares
  - Alveoli pulmonum
- Cavum thoracis
  - Fascia endothoracica
  - Pleura
    - Pleura parietalis
      - Pleura costalis
      - Pleura diaphragmatica
    - Pleura pulmonalis
    - Pleura mediastinalis
      - Laminae mediastinales
      - Pleura pericardiaca
    - Cupula pleurae
    - Cavum pleurae
    - Sinus pleurae
      - Sinus phrenicocostalis
      - Sinus costomediastinalis
    - Lig. pulmonale
    - Plica venae cavae
  - Septum mediastinale
  - Cavum mediastinale cranialis
  - Cavum mediastinale medium
  - Cavum mediastinale caudale
- Gl. thyreoidea
  - Lobus (dexter, sinister)
  - Isthmus gl. thyreoideae
  - Lobuli gl. thyreoideae
  - Stroma gl. thyreoideae
- Gl. thyreoideae accessoriae
- Gl. parathyreoideae
- Thymus
  - Pars cervicalis
  - Pars thoracalis
  - Lobus (dexter, sinister)
  - Lobuli thymi

Apparatus urogenitalis

Organa uropoetica

- Renes
- Ren dexter
- Ren sinister
  - Facies dorsalis
  - Facies ventralis
  - Margo lateralis
  - Margo medialis
    - Hilus renalis
    - Sinus renalis
  - Extremitas cranalis
  - Extremitas caudalis
  - Capsula adiposa
  - Tunica fibrosa
  - Tunica muscularis
  - Substantia corticalis
  - Substantia medullaris
  - Lobi renales
  - Pyramides renales
  - Basis pyramidis
  - Papillae renales
  - Crista renalis
  - Area cribrosa
  - Foramina papillaria
  - Columnae renales
  - Lobuli corticales
    - Pars radiata
    - Pars convoluta
  - Corpuscula renalia
  - Glomeruli
    - Capsula glomeruli
  - Tubuli renales
    - Tubuli renales contorti
    - Tubuli renales recti
    - Ductus papillares
  - Pelvis renalis
    - Recessus terminales
  - Calyces renales
    - Calyces renales majores
    - Calyces renales minores
  - Gl. pelvis renalis
  - Arteriae renis
    - Aa. interlobares renis
    - Aa. arciformes
    - Aa. interlobulares
      - Vas afferens

- Ren sinister
  - Arteriae renis
    - Aa. interlobulares
      - Vas efferens
    - Rami capsulares
    - Arteriolae rectae
    - Aa. nutriciae pelvis renalis
  - Venae renis
    - Vv. interlobares
    - Vv. arciformes
    - Vv. interlobulares
    - Venulae rectae
    - Vv. stellatae
- Ureter
  - Pars abdominalis
  - Pars pelvina
  - Tunica adventitia
  - Tunica muscularis
    - Stratum externum
    - Stratum medium
    - Stratum internum
  - Tunica mucosa
  - Glandula mucosae ureteris
- Vesica urinaria
  - Vertex vesicae
  - Corpus vesicae
  - Fundus vesicae
  - Collum vesicae
  - Facies dorsalis
  - Facies ventralis
  - Lig. umbilicale medium
  - Ligg. umbilicalia lateralia
  - Urachus
  - Tunica serosa
  - Tunica muscularis
    - Stratum externum
    - Stratum medium
    - Stratum internum
    - M. sphincter vesicae
  - Tela submucosa
  - Tunica mucosa
    - Gl. vesicales
    - Noduli lymphatici vesicales
  - Trigonum vesicae
    - Uvula vesicae

- Vesica urinaria
  - Trigonum vesicae
    - Plica ureterica
    - Orificium ureteris
  - Orificium urethrae internum
  - Annulus urethralis
- Glandula adrenalis
  - Facies dorsalis
  - Facies ventralis
  - Basis gl. adrenalis
- Glandula adrenalis
  - Apex gl. adrenalis
  - Margo lateralis
  - Margo medialis
  - Substantia corticalis
  - Substantia medullaris
  - Hilus gl. adrenalis
  - Vena centralis
  - Gl. adrenales accessoriae

ORGANA GENITALIA

ORGANA GENITALIA MASCULINA

- Testis
  - Facies lateralis
  - Facies medialis
  - Margo liber
  - Margo epididymidis
  - Extremitas capitata
  - Extremitas caudata
  - Tunica albuginea testis
  - Mediastinum testis
  - Septula testis
  - Lobuli testis
  - Parenchyma testis
  - Tubuli seminiferi contorti
  - Tubuli seminiferi recti
  - Rete testis
  - Ductuli efferentes testis
  - Sperma
  - Epididymis
    - Caput epididymidis
    - Corpus epididymidis
    - Cauda epididymidis
    - Lobuli epididymidis
    - Ductus epididymidis
    - Lig. epididymidis
    - Sinus epididymidis
  - Ductuli aberrantes
  - Appendix testis
  - Appendix epididymidis
  - Paradidymis
  - Ductus deferens
    - Ampulla ductus deferentis
      - Diverticula ampullae
    - Tunica adventitia
    - Tunica muscularis
- Testis
  - Ductus deferens
    - Tunica muscularis
      - Stratum externum
      - Stratum medium
      - Stratum internum
    - Tunica mucosa
  - Ductus ejaculatorius
  - Vesicula seminalis
    - Corpus vesiculae seminalis
    - Tunica adventitia
    - Tunica muscularis
    - Tunica mucosa
    - Ductus excretorius
  - Funiculus spermaticus
  - Tunica vaginalis testis et funiculi spermatici
    - Lamina parietalis
    - Lamina visceralis
    - Mesorchium
    - Tunica vaginalis communis
    - Tunica vaginalis propria
      - Plica ductus deferentis
    - M. cremaster internus
  - Descensus testis
  - Gubernaculum testis
  - Processus vaginalis
  - Annulus vaginalis
- Prostata
  - Facies dorsalis
  - Facies ventralis
  - Lobus (dexter et sinister)
  - Isthmus prostate
  - Corpus prostatae

- Prostata
  - Pars disseminata prostatae
  - Ductus prostatici
  - Succus prostaticus
- Glandula bulbourethralis
  - Ductus excretorius
- Uterus masculinus
- Partes genitales externae
  - Penis
    - Corpus penis
    - Radix penis
    - Crus penis
    - Flexura sigmoidea penis
    - Dorsum penis
      - Sulcus dorsalis penis
    - Facies urethralis
      - Sulcus urethralis
    - Glans penis
      - Processus dorsalis glandis
      - Pars longa glandis
      - Bulbus glandis
      - Corona glandis
      - Collum glandis
      - Fossa glandis
      - Processus urethrae
      - Septum glandis
    - Corpus cavernosum penis
      - Septum penis
      - Os penis
    - Corpus cavernosum urethrae
      - Bulbus urethrae
      - Hemispheria bulbi urethrae
      - Septum bulbi urethrae
    - Tunica albuginea corporum cavernosorum
    - Trabeculae corporum cavernosorum
    - Cavernae corporum cavernosorum
    - Arteriae helicinae
    - Venae cavernosae
    - Fascia penis
    - Lig. suspensorium penis

- Partes genitales externae
  - Penis
    - Musculi penis
      - M. retractor penis
      - M. ischiocavernosus
  - Praeputium
    - Raphe praeputii
    - Ostium praeputiale
    - Annulus praeputialis
    - Diverticulum praeputiale
    - Frenulum praeputii
    - Glandulae praeputiales
    - Smegma praeputii
    - Noduli lymphatici praeputiales
    - Musculi praeputiales
      - M. praeputialis cranialis
      - M. praeputialis caudalis
  - Scrotum
    - Cutis scroti
    - Raphe scroti
    - Fascia scroti
    - Tunica dartos
    - Septum scroti
- Urethra masculina
  - Pars pelvina
  - Pars externa
  - Ampulla urethrae
  - Isthmus urethrae
  - Bulbus urethrae
  - Crista urethralis
  - Colliculus seminalis
  - Ostium ejaculatorium
  - Orificium urethrae externum
  - Processus urethrae
  - Fossa navicularis urethrae
  - Tunica mucosa
    - Gl. urethrales
  - Stratum cavernosum
  - M. urethralis
  - M. ischiourethralis
  - M. ischioglandularis
  - M. ischiobulbosus
  - M. urethrocavernosus

ORGANA GENITALIA FEMININA

- Ovarium
  - Facies lateralis
  - Facies medialis

- Ovarium
  - Margo liber
  - Margo mesovaricus

- Ovarium
  - Hilus ovarii
  - Extremitas tubaria
  - Extremitas uterina
  - Bursa ovarica
  - Tunica albuginea
  - Stroma ovarii
  - Zona vasculosa
  - Zona parenchymatosa
    - Folliculi oophori vesiculosi
      - Theca folliculi
      - Liquor folliculi
      - Stratum granulosum
      - Cumulus oophorus
      - Ovulum
      - Corpus luteum
      - Corpus albicans
    - Mesovarium
    - Lig. ovarii proprium
  - Tuba uterina
    - Extremitas abdominalis
    - Extremitas uterina
    - Ostium abdominale tubae
    - Ostium uterinum tubae
    - Infundibulum tubae uterinae
    - Fimbriae tubae
      - Fimbriae ovaricae
    - Hydatides terminales
    - Ampulla tubae uterinae
    - Isthmus tubae uterinae
    - Tunica serosa
      - Mesosalpinx
    - Tunica adventitia
    - Tunica muscularis
    - Tela submucosa
    - Tunica mucosa
      - Plicae tubariae
- Uterus
  - Corpus uteri
    - Facies dorsalis
    - Facies ventralis
    - Margo lateralis
  - Fundus uteri
  - Cornua uteri
    - Margo mesometricus
    - Margo liber
  - Cervix uteri
    - Portio vaginalis cervicis
  - Cavum uteri
- Uterus
  - Canalis cervicis uteri
  - Plicae canalis cervicis uteri
  - Orificium uteri internum
  - Orificium uteri externum
  - Lig. latum uteri
    - Mesometrium
  - Lig. teres uteri
  - Tunica serosa
  - Tunica muscularis
  - Tunica mucosa
    - Cotyledones uteri
    - Glandulae uterinae
- Vagina
  - Facies dorsalis
  - Facies ventralis
  - Fornix vaginae
  - Tunica serosa
  - Tunica adventitia
  - Tunica muscularis
  - M. constrictor vaginae
  - Tunica mucosa
    - Hymen
- Epoophoron
  - Ductus epoophori longitudinalis
- Paroophoron
- Vestibulum vaginae
  - M. constrictor vestibuli
  - Tunica adventitia
  - Tunica muscularis
  - Tunica mucosa
    - Gl. vestibulares
  - Bulbus vestibuli
  - Orificium urethrae externum
  - Diverticulum suburethrale
- Partes genitales externae
  - Vulva
    - Rima vulva
    - Labia vulvae
    - Commissura labiorum dorsalis
    - Commissura labiorum ventralis
    - Fossa clitoridis
  - Clitoris
    - Corpus clitoridis
    - Crus clitoridis
    - Glans clitoridis
    - Praeputium clitoridis
    - Frenulum clitoridis
    - Smegma clitoridis

- Partes genitales externae
  - Clitoris
    - Corpus cavernosum clitoridis
    - Tunica albuginea corporis cavernosi (clitoridis)
    - Septum corporum cavernosorum (clitoridis)
    - Trabeculae corporum cavernosorum (clitoridis)
    - Cavernae corporum cavernosorum (clitoridis)
    - M. ischiocavernosus
- Urethra feminina
  - Orificium urethrae externum
  - M. urethralis
  - Stratum cavernosum
  - Tunica muscularis
- Urethra feminina
  - Tela submucosa
  - Tunica mucosa
    - Gl. urethrales
- Termini ontogenitici
  - Membranae deciduae
    - Amnion
    - Allantois
    - Chorion
      - Villi chorii
    - Placenta
      - Placenta uterina
      - Placenta fetalis
  - Funiculus umbilicalis
    - Vena umbilicalis
    - Arteria umbilicalis
    - Urachus

DR. MURPHEY: I want to know if the Doctor knows that the Executive Committee will report at this session on the terms proposed? It seems to some of the members present that possibly reference of this material to the teaching anatomists of this country would facilitate some of the debate. There are others that are interested directly in this, aside from the members of the committee, and I would like to know whether we are going to have a special report, or whether it is going to be carried over until another year.

PRESIDENT MOHLER: The committee will no doubt be continued another year, and this preliminary report I believe, Doctor, will be included in the Proceedings of this meeting.

DR. MURPHEY: May I add a motion, Mr. Chairman?

PRESIDENT MOHLER: There is a motion before the house.

DR. MURPHEY: May I add an amendment to the motion that the committee be continued, and sufficient funds furnished them by the Treasurer to carry on this work.

Motion seconded.

PRESIDENT MOHLER: The amendment to the motion which has been seconded is that the committee be continued, and that sufficient funds be provided for the continuation of this work. Any discussion?

DR. WHITE: There is only one question, but I think it is very essential that we put some limit on the amount this committee is authorized to expend, some definite amount.

DR. LYMAN: If I recollect last year we put on a limit of $500.

PRESIDENT MOHLER: Three hundred dollars was the limit last year, I think.

DR. WHITE: If Dr. Murphey would add it to his amendment, I would like him name that amount.

PRESIDENT MOHLER: Dr. Murphey, is that agreeable to you, $300?

DR. MURPHEY: I understood from the members of the committee that they thought that was insufficient at the time.

PRESIDENT MOHLER: They have not expended that much this year.

A Member: I would like to make a motion—

President Mohler: There is a motion before the house and an amendment.

Dr. Murphey: I will accept that suggestion of $300 as part of my amendment for necessary funds.

President Mohler: Are you ready for the question? The question is on the adoption of the amendment, which is, to continue this committee on nomenclature for another year with an appropriation of $300 to carry out the work. All in favor of this amendment say aye, opposed no. The ayes have it and the amendment is adopted.

The question now recurs on the main motion as amended, to dispense with the reading of the report, to receive the report, and refer it to the Executive Committee for action. Are you ready for the question?

All in favor will manifest the same by saying aye, opposed no. It is carried.

President Mohler: I believe Dr. Boor is ready to report now for the Committee on Necrology, so I will call for the report of that committee.

Dr. Boor: Mr. President and fellow-members: In making this report I will say that we were handicapped in a way which I suppose all like committees are, in that it is hard to get data. At the very last minute we have learned of the probable death of two or three members, so reported by the postal authorities, and in reporting these deaths it is as far as we can go. I wish to mention that fact, and if there is any member here present that knows of the death of a member, or if these notices that we have received from the postal authorities are not correct, we would like to have them so state, as it is not a very pleasant thing to write an obituary of somebody before he is dead. It is bad enough to have to write it afterward.

REPORT OF COMMITTEE ON NECROLOGY

O. L. Boor, Chairman
Samuel Brenton A. H. Baker
J. G. Wills A. Bostrom

The report of this committee is made with extreme regret as seven faithful and honored members have been called to the Great Beyond during the past year, one of whom died prior to the meeting of 1912, but evidently his death was unknown to the Committee on Necrology, and even now the particulars are very meager. Of another we know practically nothing except that he has been reported "dead" by the postal authorities. Further information in regard to one or both of these members will be gratefully received by this committee.

Thomas Earle Budd, D.V.S.

Dr. Budd was born in Pemberton, New Jersey, in 1860, and died at the Orange Memorial Hospital, Orange, New Jersey, September 13, 1912. His death was due to blood-poisoning, said to have been contracted while holding an autopsy on a cow thought to have been affected with anthrax.

He studied at the University of Pennsylvania, after which he entered the American Veterinary College of New York City, and received his degree in 1892. He practised a short time at Woodbury, New Jersey, going from there to Orange, where he enjoyed a lucrative practice to the time of his death. He was active in his profession, and also in the affairs connected with his professional work.

He has filled the following official positions: member of the Army Legislative Committee, A. V. M. A.; member of Livestock Commission of New Jersey; Treasurer of the New Jersey State Board of Veterinary Medical Examiners; Veterinarian to the Essex County Park Commission; Veterinarian to the Essex Troop, National Guard, State of New Jersey; and Inspector of Tuberculosis of the State of New Jersey.

He was an active member of the New Jersey Veterinary Medical Association, and served as President of that body; he also occupied the executive office of the Alumni Association of the New York-American Veterinary College.

William Dougherty, V.S., D.V.S.

Dr. William Dougherty was born in Gortin, Tyrone County, Ireland, 1844, and died at his home in Baltimore, Maryland, January 2, 1913, of fatty degeneration of the heart, after a short illness.

He came to America when quite young, and entered the United States Army as Director of Transportation in the Quartermaster's Department at New Orleans. After leaving the army he trained race-horses and also engaged in the stable business, until he entered the New York College of Veterinary Surgeons, from which he received his degree in 1874. In 1876 he graduated from the American Veterinary College, going immediately to Baltimore, where he continued in practice until a few years before his death, when he retired to enjoy the fruits of his labors.

He was a charter member of the Maryland Veterinary Medical Association, and an old and faithful member of the American Veterinary Medical Association, joining this organization in 1874, and entering the honor roll in 1904.

GEORGE S. BAKER, A.B., D.V.S.

Dr. Baker was born in Dunham Province, Quebec, November 18, 1860, and died at Berkeley, California, November 20, 1912, the day after his return from Manila, where he had been for one year on official business in connection with the B. A. I., having entered the service shortly after its inception, and was inspector in charge for a number of years at San Francisco.

He was a graduate of McGill University, receiving his degree in 1887, and was admitted as a member of this Association at San Francisco, in 1910.

Besides his prominence as a respected and efficient official of the B. A. I., he was noted as having been one of the early advocates of improved sanitary methods in the dairy, and was a member of the San Francisco Medical Milk Commission, and also of the National Association of Medical Milk Commissions.

WALTER MCHENRY, V.M.D.

Walter McHenry, '08, of the Veterinary Department of the University of Pennsylvania, died August 7, 1913, at his home in Waverly, Iowa. After graduation, Dr. McHenry was appointed to the teaching staff of the New York State Veterinary College, at Cornell University. More recently he was engaged in lecture work for the Bureau of Animal Industry, at Waverly, Iowa. Dr. McHenry was a member of the Alpha Psi Fraternity and the American Veterinary Medical Association.

GERALD P. DILLON, D.V.S.

Dr. Gerald P. Dillon graduated from the Veterinary Department of McGill University in 1889.

He joined the A. V. M. A. in 1909, and is reported "dead" by the postal authorities.

R. W. HEWETT, D.V.S.

Dr. Hewett was a graduate of the American Veterinary College, 1894. He joined the American Veterinary Medical Association in 1894, and died June 25, 1912.

ARTHUR C. BROWN

Dr. Brown was a graduate of the Washington State College, Veterinary Department, in 1908, and joined our Association in 1910 at San Francisco. Since graduation he has been in the employ of the Meat Inspection Service of the Bureau of Animal Industry at San Francisco. He is reported "dead" by the postal authorities.

WHEREAS, It has pleased the Almighty in His infinite wisdom to remove from our midst, our brothers and fellow-members, Doctors Thomas Earle Budd, William Dougherty, George S. Baker, Gerald P. Dillon, Walter McHenry, R. W. Hewett and Arthur C. Brown, and while we realize that they are in the loving hands of an allwise Father, nevertheless it is fitting that this Association should record its feeling of grief at their loss; therefore be it

Resolved, That in the death of each one of these, our friends and associates, this Association mourns the loss of a valued brother and fellow-member, and the profession as a whole feels their loss; and be it further

Resolved, That we extend to the family of each of our departed brothers and fellows, our sincere and heartfelt sympathy in our common bereavement, and that a copy of these resolutions be spread on the records of this Association.

It is fit and proper at this time and place, for this Association to extend its sympathy and condolence, to Doctors Samuel Brenton, of Detroit, G. H. Berns, of Brooklyn, and Wilson Huff, of Rome, N. Y., whose homes have been visited by the Angel of death since we last met, depriving them of their wives and helpmates; therefore be it

Resolved, That we extend to these brothers and members and their families our sincerest sympathy in this the greatest of all sad bereavements, and that a copy of these resolutions be spread on the records of this Association.

President Mohler: The report of the Committee on Necrology is now before you for consideration.

Dr. Lowe: I move that the report be accepted, subject to such corrections as they may find necessary, and that it be referred to the Committee on Publications. (Seconded.)

President Mohler: It has been moved and seconded that the report be accepted, subject to such corrections as may be necessary, and that it be referred to the Committee on Publications. Are you ready for the question? Those in favor of the motion say aye, those opposed no. The ayes have it and the motion is carried.

Dr. Stewart: Mr. President, I would like to state concerning the call for the meeting of the State Examining Boards, that it was requested that all members of examining boards convene for a short conference in Room 4, at 10.30. I would like to see those members just for a short period.

President Mohler: The next order of business is the report of the special Committee on Veterinary College Investigation. Is the chairman ready to report, Dr. M. H. Reynolds?

REPORT OF COMMITTEE ON VETERINARY COLLEGE INVESTIGATION

By M. H. Reynolds, Chairman
George W. Dunphy P. H. Browning

In our first year's work, 1912–13, we endeavored to inspect practically all schools recognized by this Association, either directly or by the aid of specially selected and authorized men whom we thought capable of thorough and fair investigation. A certain outline, somewhat more complicated than the one followed this year, was used, and investigation carried out with considerable detail.

Our report was made by Chairman Butler last year at Indianapolis. On account of misunderstanding between various offices involved, the supplementary report containing suggestions and criticisms for private transmittal by our Secretary to each institution, was rather badly delayed, so that the criticised schools were embarrassed in their efforts to comply with our suggestions. However, we are pleased to report that in the course of our work this year we found very general and pleasant spirit of compliance. Quite a number of schools had changes in accordance with these suggestions already under way. In some cases changes had been made before the receipt of official letter from our Secretary, and done on account of suggestions made in conversation during our work of last year.

Your committee takes this opportunity very early in our report to express our gratitude to the institutions visited for uniform courtesy and attitude of willingness to help us freely in our work. Apparently everything has been thrown wide open for us. We have been given the freest access to records and any desired information. All doors, with the exception of one, have been wide open.

We have understood that the purpose of this work is in a sense twofold. First, inspection to see if the colleges are complying with Association requirements, especially with reference to faculty, matriculation, credits given for work done in other institutions, etc. Second, to make a direct study of what the American Veterinary Medical Association can do to further veterinary education and, in a friendly way, help our schools.

The American Medical Association recognized years ago that its most important function was the supervision and elevation of medical education. We believe it is quite time for the American Veterinary Medical Association to accept this as its most important function.

We have found considerable misunderstanding among members of this Association as to the duties of this committee. In correspondence with prominent members, well informed concerning matters of education, we have found a number who seem to think it the duty of this committee to ascertain as to whether the individual schools were complying with requirements for some specific number of hours for given subjects. There are no requirements in our by-laws as to specific number of hours that must be scheduled for anatomy, pathology or clinic. Quite a number of Association members seem to have confused this committee with a similar committee representing the Federal Bureau of Animal Industry.

It has been our custom, when visiting an institution, first to make a general tour of inspection; noting class-rooms, laboratories, clinic facilities, general condition of the building, and to estimate the general surroundings of the institution. Then we have visited individual classes, selecting those in each institution that were available and where there appears to be some special reason for making such study. We have made an especially careful study of clinics, and collected definite information as to extent, variety, and how well teaching possibilities were utilized. Laboratories have been inspected as to capacity, equipment; student notebooks have been examined; professors and demonstrators have been interviewed when thought best.

Before giving our conclusions and recommendations, it has been thought best to present some materials gathered from a study of the American Medical Association.

Your chairman has been in correspondence with Dr. Colwell, secretary of the Council on Medical Education for the American Medical Association, and as a result of this we have some things to report concerning educational matters under supervision of that great association.

The American Medical Association has a permanent "Council on Medical Education." This consists of five men, appointed by the president and confirmed by the House of Delegates. The term of service is five years, one man retiring each year. This "Council of Medical Education" expends funds as necessary for its work, subject to authorization by the trustees, and reports annually to the parent association.

As result of the work of this council the American Medical Association maintains a classified list of medical colleges. The latest list in possession of your committee shows revision to April, 1913. The standard fixed for medical colleges by this council, defines "An Acceptable Medical College" as follows, and this is their basis for rating medical colleges:

Admission of Students. Strict enforcement of A. M. A. standards and requirements; at least four years high-school, and in addition one year of college work, including especially eight semester hours for each of the following: physics, chemistry, biology and German or French.

The high-school credit acceptable for admission to the preliminary college year, includes fourteen required and elective units. Nine of the fourteen units must be taken in English, mathematics, Latin and history. The other five units may be made up as electives from a variety of other subjects.

The preliminary college year must extend through one full college session of thirty-two weeks, and the A. M. A. insists that the amount and quality of teaching during this preliminary year, whether given in the medical college, or in some other institution, must be fully equal to similar work in standard colleges and universities. The A. M. A. prescribes the number of semester hours of didactic, and the number of laboratory hours for each subject, in this preliminary college year.

This great medical association holds that an "acceptable medical college," after complying with these matriculation requirements, must supply a fully graded four-year course, thirty-two weeks each year, exclusive of time given to matriculation and holidays, and must give thirty hours per week of actual work. Our own by-laws call for three years, of seven months, equivalent to about thirty weeks.

The A. M. A. requires of its "acceptable medical college" that two years' work should consist largely of laboratory work, in well-equipped laboratories, covering the usual subjects, and that two years be given to clinical work, largely in hospitals and dispensaries, together with the necessary courses in surgery, obstetrics, etc., or what we may call directly practical subjects.

The American Medical Association asks that, as soon as conditions warrant, a fifth undergraduate year shall be spent by students as hospital internes.

This association, which corresponds for the medical profession to the A. V. M. A. for ours, asks for six thoroughly trained specialists in laboratory branches, salaried men giving their entire time in instruction and research work, but whose first interest and duty shall be the training of students, Four of these six men are to be in charge of anatomy, physiology, pathology and bacteriology, chemistry and pharmaceutics. It is suggested that a fifth laboratory man should be assigned to histology and embryology, under the department of anatomy, and one more in the department of pathology and bacteriology, giving special attention to clinical diagnosis.

The Council Committee supported by the A. M. A. insists on abundant hospital facilities, and constantly urges the establishment, as far as possible, of the clinical or laboratory method of teaching. As result of the council's work, the A. M. A. asks for a good working library, including specifically the *Index Medicus*, and at least thirty leading medical periodicals, housed in a well-lighted, comfortable, easily accessible room, equipped with suitable tables for work, and a librarian in charge. It also asks for carefully planned, labeled and well-indexed museum, with case and autopsy records, as nearly as possible for each specimen, and with microscope slides for studying minute structure.

Considerable emphasis is put by the Council on Medical

Education on the need and proper use of physiological laboratory work and the laboratory teaching of this subject.

Medical schools are listed as follows:

"*Class A-plus.*" Well organized, thoroughly equipped and enforcing the preliminary requirements of one college year for matriculation. Twenty-four medical schools.

"*Class A Acceptable Schools.*" Notified that they could make certain improvements to advantage. Thirty-four schools in this group.

"*Class B.*" Institutions that need very general improvement to be made acceptable.

"*Class C.*" Colleges requiring complete reorganization to make them acceptable. Twenty-nine.

Advanced standing in matriculation may be given only for work done in acceptable colleges; that is those rated as "Class A-Plus" and "Class A."

Students from "Class B" schools may be given advanced standing up to third-year entrance, subject to recommendation from subject teachers in charge. Students from "Class C" schools may not be given advanced standing higher than entrance to second year, and then only after thorough examination in first-year subjects.

The American Medical Association insists on a good system of records covering credentials, attendance, grades and accounts. We are much pleased to report for American veterinary schools that there has been a very great improvement in this respect during the past two years. Most of the schools inspected were able to present these records in very convenient and creditable shape.

It is freely asserted in the American Medical Association that more progress has been made in medical education during the last six or seven years than in the previous sixty years, and credit for this is given largely to their Council on Medical Education. This reminds one of recent rapid developments in veterinary education, due to Federal Bureau of Animal Industry work and recent work of our own Association.

In 1904 our medical brethren had reached a maximum number of 166 medical colleges, about one-half of all the medical colleges in the world. Since 1904 there has been a decrease to 129 in 1911. 20 out of the total 44 decrease were in cases of institutions closed outright; the other 24 were merged with others, so as to establish institutions that could meet A. M. A. requirements. In other words, the decrease was due to the closing of weak and inefficient schools and the establishment of fewer but more efficient institutions.

In this study of American medical education it has been interesting to note that there has been a great improvement, not only in standards of curriculum and equipment, but also matriculation. Up to 1904 less than 2 per cent. of all American medical colleges required more than high-school education. In 1911 practically 33 per cent. of American medical colleges required one or more years of collegiate work.

It is encouraging to note, for the progressive and well-equipped veterinary school, that among medical colleges during the year 1909–10, when 14 per cent. of the colleges required more than high-school matriculation, that this 14 per cent. of the schools had 20 per cent. of the total student enrolment.

In 1911 twenty-eight medical schools were requiring two or more years of collegiate work; thirteen were requiring one year of collegiate work. Six other schools reported that one year of college work would be required for the following school year. This gives a total of forty-seven medical colleges requiring for matriculation one or more years of collegiate work.

The number of medical students in the United States appears to have reduced from over 28,000 in 1904 to something over 21,000 in 1910, due in considerable measure to higher requirements; but attendance in the high standard schools increased from 728 to 4320 during the same period.

General Conclusions

In general we have found the fitness of veterinary faculty members satisfactory, both technically and personally. A few exceptions have been noted, and attention of the management called to such deficiency as noted in the supplement to this report. Your committee has accumulated a complete record of the preliminary education, technical education, experience in practice and experience in teaching of faculty members filling all the more important places. We find that the preliminary education, technical training and subsequent experience have in general been found reasonably satisfactory, with the exception of the teachers of laboratory subjects in two schools; and the same is true in general statement of the personal fitness, *i. e.*, the fitness of faculty members for personal association with young students.

Concerning conditions, both ethic and esthetic, surrounding our veterinary schools and in the institutions themselves, and concerning surrounding social conditions and general effects of these factors upon the young students' ideals, we regret to report that several of our institutions do not measure up well in this regard. In other institutions the buildings, class-rooms and laboratories are kept neat and attractive, good order and gentlemanly behavior are insisted upon, and faculty supervision had over students' social affairs.

Your committee in the course of its efforts during two years' work has been led to the conclusion that this is a matter of very great importance to our profession, and one that has been too generally overlooked, if our profession is to make as rapid progress as possible, away from the dirty livery stable office standard of veterinary practice and conduct. We believe it is just as true of veterinary colleges as of other educational schools, that when young people leave their homes and go to such institutions for their education and preparation for a life-work, that the institution owes it, not only to its student body, but to the public in general, to do all it reasonably can to instil good ideals and to some extent exercise the function of the absent parent; and that our institutions have not by any means done their whole duty by their student body when they have taught a given amount of anatomy, chemistry, etc., and then turned the students loose with no further feeling of responsibility.

Concerning the amount and distribution of instructional work among faculty members, this has been found to be very generally satisfactory. We have few veterinary institutions now, concerning which fair statement can be made, that two or three men are doing most of the work; that these men are so badly overloaded that they cannot do efficient teaching work in the variety of subjects assigned them, and where the rest of the so-called faculty members are chiefly figure-heads.

We consider the distribution of subjects and amount and variety of work done by faculty members in general to be very satisfactory. Concerning the number of graduate veterinarians on the faculties and eligibility to membership in the A. V. M. A., we have found, without exception, that all of the colleges recommended in this report for recognition in the A. V. M. A. more than meets our by-law requirements, and that faculty members are very generally active members of this Association.

Matriculation requirements vary considerably in different institutions and especially in the two chief classes of institutions. In the state institutions we find that matriculation is taken from the veterinary faculty, and is in the hands of a special officer, or of a matriculation committee reporting to the registrar of the institution.

We find that examinations as conducted by or for veterinary faculties in private institutions is fully complying with the letter of our Association by-laws, and with very few exceptions quite fully and fairly with the spirit of our by-laws as well. We have not found a single case during the past year where it seemed probable that examinations were not conducted in a fair and honest manner, so as to get honest papers for markings. The questions in a very few cases were too easy, but the markings with few exceptions had been very fair. We have taken pains at each institution to draw fifteen or twenty complete sets of papers at random and examine these quite carefully, and we feel that there can be no reasonable doubt concerning our findings on this point.

Records of acceptances in lieu of matriculation examinations have without important exception been satisfactory to your committee. In two or three somewhat irregular cases we were satisfied that the action taken was done in good faith, and that the students in question were really well equipped for beginning the study of veterinary medicine.

We are very much pleased to report that year by year there has been a steady increase in the number of matriculates who have had two or more years of high school and in the number of high school graduates.

Our estimate of the general class and character of our present veterinary student body, as compared with previous years, has without exception been in favor of the later classes.

Concerning the actual efficiency of instructional work, we have grouped our investigation on this point under class-room work; clinic work; other laboratories; and class attendance. It is quite true, of course, that on each faculty (and this is not confined to any class of schools) there are usually some faculty members whose actual teaching efficiency is considerably below that of the average of the faculty. This is unavoidable in the very nature of things. But on a large average, classroom work is being reasonably well done in our veterinary schools, and, so far as our best-equipped and best-manned veterinary schools are concerned, we believe that the class-room work is fully equal to that given in other classes of educational institutions.

We find that the extent and variety of clinic and use of clinical material differs greatly. In some cases a comparatively small clinic is exceedingly well used, so that students get a really good clinical training, and the needful development in keen observation and skilful manipulation. In other cases a large clinic, managed largely for private financial income, is handled in a miscellaneous sort of a way as a clinic, and is not utilized to its best teaching value by any means.

Your committee takes pleasure in noting that within a few years very great changes have been made in laboratory facilities, equipment and management; laboratory work in pathology, histology, chemistry, physiology, pharmaceutics, etc., was not long ago considered as of very minor importance and too frequently neglected. Today all of the veterinary schools recommended to the A. V. M. A. in this report have at least fairly good equipment, teaching methods, and general facilities for these subjects. In a very considerable number of our institutions the facilities for good laboratory training are all that could be reasonably desired, but we would respectfully call attention to the fact, which stands out very plainly after our investigation, that some of our veterinary colleges have not exercised sufficient care in the selection of specially trained laboratory men for laboratory subjects. This is hardly permissible in the present condition of veterinary education.

Another criticism which we must place against the laboratories in our veterinary schools, concerns an apparent tendency to neglect matters of cleanliness and appearance. There still seems to be an impression in many institutions that it does not make much difference whether the laboratory rooms are clean and tidy or not, so long as the rest of the building is kept reasonably clean.

Our investigation concerning student attendance upon class work indicates that we are quite justified in assuming that there is no further need for careful investigation on this point for the present. Veterinary faculties are all realizing the necessity of regular attendance at class work and clinic work. The calling of class rolls, marking absentees a general minimum of 80 per cent. attendance, is now general everywhere in our recognized schools.

Fitness for graduation is still determined in the old ways, *i. e.*, on the basis of scholarship as determined by written examinations and laboratory tests by individual faculty members. Examinations and practical demonstration tests are conducted by individual faculty members, who, of course, vary greatly in opinion as to what constitutes a fair and proper set of examination questions. For the present there does not appear to be any better method available for this country. Our opinion is to the effect that on the large average, tests of fitness for graduation and admission to the veterinary profession are fairly conducted, and for the present may be wisely left in the hands of institutional faculties.

Concerning the consideration given to the moral fitness of candidates for graduation, your committee is of the opinion that this is also fairly well done, and, while comparatively few young men are refused graduation on account of moral character, the satisfactory explanation is that such young men are usually sent home or politely requested not to return for further work, and that this is done, as a rule, long before they reach the last semester.

There have been no important changes in college years, vacations, or number of working days, which we consider of sufficient importance to notice in this report.

Recommendations

Matriculation. The first great need which has been more and more deeply impressed upon your committee, as a result of this close personal study, is the need of higher matriculation requirements. We agree heartily with the general impression that seems to exist throughout this Association, that this is the first and most fundamental thing in professional improvement; that this is a pivotal point in veterinary education, and when we move this pivotal point we necessarily move the whole structure.

There does not appear any necessity for any sudden and extreme movements. Veterinary schools that have been doing good work for so many years deserve, and in the interests of this Association must have, careful consideration and reasonable protection, so long as they appear willing to raise matriculation requirements with moderate rapidity.

The veterinary field now fairly well filled, there does not exist the urgent demand for large numbers of veterinarians, and the public can now afford to pay more money and wait a longer time for more thorough preparation of its young men.

Physics, physiological chemistry and natural science subjects and modern languages should come into the preliminary education. The natural sciences should include especially physics and biology. Chemistry should tend largely toward physiological chemistry, and we need to realize more clearly that physiological chemistry is a fundamental thing that underlies all physiology, therapeutics, pathology and almost everything else in medical study.

Fusion of Committees

It has been somewhat difficult for us to draw a satisfactory line between the functions of our Committee on Intelligence and Education and the functions of this Committee on Veterinary Colleges. There does not appear to be any good reason for the continuance of two separate committees in this field, and we would therefore recommend for consideration the desirability of fusing these two committees and making such provision for future actual inspection work as may be thought best.

We would suggest it be clearly understood that the function of this combined committee is not only to ascertain whether individual colleges are complying with our by-laws, but on the contrary, this in the future should be a relatively minor part of its work. Its larger duty should be to study the question constantly and make recommendations to the Association and to the individual schools concerning points wherein veterinary education should be further improved. We urge in this connection that our schools should no longer try to develop men capable of doing satisfactory routine practice without sufficient regard to standards of citizenship or professional ideals. Every effort should be made toward improvement along these lines, which have been too much neglected in the past.

Provision should be made so that this future committee may provide for inspection of schools as thought best.

This future committee should be constantly studying the whole needs of American veterinary colleges in the interests of the general profession.

Curriculum

The veterinary courses offered by our veterinary colleges (and the same thing is true of medical colleges), leave out of the course, or give little attention to what appear to your committee to be important subjects.

In dietetics, *e. g.*, the modern veterinary student gets a little teaching along the lines of zoötechnics and stock-feeding. Our older practitioners did not get any such instruction, and so, of course, there is some progress, but the amount and thoroughness of the teaching in the line of dietetics leaves very much to be desired. In certain diseases it may be quite important to increase or restrict proteid or carbohydrate material in the diet. How many students graduated in 1913 have any clear and full information concerning balanced rations or the different nutrient values of corn, oats, barley, clover, alfalfa, or upland prairie hay? If their farmer friends ask how to balance up a proper feeding ration, when certain common foods are available on the farm, I wonder how many could give intelligent advice?

In several schools visited, the work in materia medica and therapeutics appeared weak and deficient. Students are being graduated from some schools where we suspect the best of them would have great difficulty in recognizing very commonly used drugs. When limited instruction in materia medica comes very early in the course, the student has abundant opportunity to forget most of it before he has had sufficient general instruction to appreciate it, and connect it up with later teaching in theory and practice.

Perhaps our institutions could well afford to sacrifice a little of the more scientific teaching, and perhaps a little of practice and surgery, and give more and better teaching to materia medica and therapeutics.

The next great need with which we are impressed is the need for more clinical experience, such as the young physician gets as a hospital interne. This has in the past been particularly true in several state institutions, but there appears to be a sensible effort to correct this deficiency. It has been altogether too common in the past, that the young veterinarian had about all of his practical work after graduation, and was compelled to start in practice almost without practical experience.

We recommend to veterinary faculties in general a careful consideration of their clinical work, with a view to seeing if their use of clinics cannot be put in better harmony with the modern laboratory methods of teaching, which has been rapidly substituting in late years for the older didactic methods. The student should not merely see, but, so far as possible, actually do things.

Museum and Library

Museums in our veterinary colleges, as a rule, deserve much more consideration, and we believe that the student body can be greatly benefited by a carefully selected, plainly labeled and well-arranged museum, selected and arranged particularly for its teaching value, and not merely as an advertisement or as a matter of curiosity. Clinical history, together with microscope sections should be carefully preserved and filed for reference.

Every veterinary school should have a good working medical library, stocked with recent and authoritative works upon all phases of veterinary practice, and should have a good variety of veterinary, medical and pharmaceutical periodicals.

The veterinary periodicals should include all the American and selected representatives of the British, German, and French publications. We have rather commonly found institutional libraries neglected. There should also be on file in such library, a good collection of bulletins and pamphlets on veterinary, medical and live-stock subjects, filed in available form. It is now an easy matter to collect such bulletins and reprints by merely filing application for bulletins of certain specified classes, with research laboratories and agricultural experiment stations.

Standard Curriculum

Attention was called in the report of this committee last year, at Indianapolis, that our work had been very much hampered by absence of any Association standard for judging the curriculum of an institution. We called attention to the fact that the work of such a committee of ours, should not be based too largely on individual opinions and standards. Attention was called in that report to the fact that a very incompetent veterinary college could comply with all existing requirements of our by-laws. An institution could give a very insufficient amount of teaching to a major subject, or even omit an important subject, and still comply with the by-laws. We therefore urge that there shall be no delay in correcting this condition of affairs, by the adoption of an amendment covering this point offered by our committee in last year's report. This recommendation was adopted by the unanimous action last year, was properly published (see page 175 Report 1912) and should come up for final action at this present meeting.

This will give future committees definite standards for matriculation, curriculum, length of course, qualifications of faculty members, transfer of students, etc. The requirements in these details correspond with requirements of our Federal Bureau of Animal Industry, so their adoption can put no additional hardship upon veterinary schools.

Moral and Social Responsibility

Our anatomy and surgery, lameness, theory and practice, etc., are all now being fairly well taught. Our American schools are certainly turning out practical men, but there are evident needs in some directions for improvement. We are deeply impressed with the thought that more attention should in the future be given to citizenship. There should be more of social and moral supervision; more attention should be given to cleaner and more attractive surroundings. There should be such things for instance as general lecture courses, development of institutional Y. M. C. A., and that sort of thing. In other words there should be a constant effort towards higher and higher ideals.

Someone may say that it is the function of a technical school to turn out technically trained men for practical lines of work—that it is the function of a veterinary school to turn out veterinarians, and this is of course quite true, but it is also the duty of our veterinary school to turn out gentlemanly veterinarians, and good citizens, and this means more to the profession itself perhaps than to the general social body.

Approved Institutions

As a result of our work for the year, we take pleasure in reporting that we find the following Veterinary Colleges are complying with requirements of the A. V. M. A.:

Alabama Polytechnic Institute, College of Veterinary Medicine.
Chicago Veterinary College.
Cincinnati Veterinary College.
Colorado State College, Division of Veterinary Medicine.
George Washington University, College of Veterinary Medicine.
Grand Rapids Veterinary College.
Indiana Veterinary College.
Iowa State College, Division of Veterinary Medicine.
Kansas City Veterinary College.

Kansas State Agricultural College, Veterinary Department.
McKillip Veterinary College.
Michigan Agricultural College, Department of Veterinary Medicine.
New York State Veterinary College (New York City).
New York State Veterinary College (Ithaca).
Ohio State University, College of Veterinary Medicine.
St. Joseph Veterinary College. (Beginning with matriculation of 1911).
San Francisco Veterinary College.
State College of Washington, Veterinary Department.
Terre Haute Veterinary College.
United States College of Veterinary Surgeons.
University of Pennsylvania, School of Veterinary Medicine.

The University of Toronto, Ontario Veterinary College, is not included in this list, as your committee was given to understand by its management that an inspection by the committee representing this Association, would not be especially welcome, and could not be had, without official permission from certain administrative officials of the Dominion. We wish to make it plain that this is not intended in any sense as an adverse report.

Plan of Report

Your committee has again decided to present its findings in two sections, as we did last year at Indianapolis, *i. e.,* one portion to the Association to be read and discussed in open meeting, and published in the Annual Report. A second portion reports to inspected schools. We have deposited with our Secretary this second section or Supplementary Report, which consists of a statement concerning each individual school, and intended for transmission to the proper executive officer of the institution. Each institution is to receive only that portion which relates to its own affairs. In this way we may be much freer in our criticisms and suggestions than we could be in an open report, without an endless amount of useless discussion and without stirring up a great deal of unpleasant feeling among alumni of the criticised schools. Actual experience during the past year has demonstrated to our satisfaction the wisdom of this procedure.

As mentioned in our opening remarks, the suggestions which we offered last year have been very kindly received by all the schools involved, with the exception of one previously referred to in this report. We have found a general willingness to comply with suggestions made last year, and, so far as we could observe, the suggestions and criticisms were taken in the very best of spirit. We believe that very largely the reason for this lies in the quiet way in which the suggestions for improvement reached the schools.

So far as we have been able to observe, this plan has made good in actual experience, and we now recommend that it be continued in connection with this present report. It has been this supplementary report which has cost us the most time and caused your committee the most anxiety, on account of feared injustice or inaccurate statement.

In case our Association Secretary does his duty promptly, and an inspected institution fails to hear from us, this may be understood as indicating—no criticism of sufficient importance to report.

PRESIDENT MOHLER: What is your pleasure regarding this report?

DR. LOWE: I move you, sir, that we receive this report, and that we take up for consideration and action its several recommendations.

DR. WHITE: I think the better course, Mr. President, would be to refer it to the Executive Committee.

DR. LYMAN: I make that motion, Mr. President.

(Motion seconded and carried.)

PRESIDENT MOHLER: The next item on the program is the report of Veterinary Committee on Education in Agricultural Colleges, Dr. A. M. Farrington, Chairman. Is any one of the committee ready to make a report for the chairman?

DR. PAUL FISCHER: Mr. President, as Dr. Farrington is not here, I will read the report.

REPORT OF COMMITTEE ON VETERINARY EDUCATION IN AGRICULTURAL COLLEGES

A. M. FARRINGTON, Chairman
PAUL FISCHER JAMES B. PAIGE

The problem given to your Committee on Agricultural Education is as follows:

WHEREAS, The veterinary instruction given in agricultural colleges to students pursuing the four-year agricultural courses varies materially in the several agricultural colleges, and

Whereas, Graduates of agricultural colleges, may receive one-year time credit in veterinary colleges, accredited by this Association, providing said graduates in agriculture have had sufficient veterinary science; be it

Resolved, That the president appoint a committee of three to outline such sufficient veterinary science, and to recommend to agricultural colleges the extent and scope of veterinary science which this Association believes should be included in such agricultural courses.

The committee began its inquiry in an endeavor to ascertain the amount of veterinary instruction at present given at the various agricultural colleges of the United States. The size of this task may be appreciated when one considers that each state is a law unto itself and the curriculum of each college has been formulated by a different set of men, acting independently, each with different ideas and different local conditions to meet and satisfy. As suggested in the preamble, the courses vary materially in the several agricultural colleges.

This variation extends from one institution that gives only one course of thirty lectures, delivered by a veterinarian in private practice who is hired to give such a course to the senior class, to another institution that employs three veterinarians who devote their time almost exclusively to teaching veterinary science and are furnished with adequate equipment for such teaching.

As a rule these colleges give very satisfactory courses and have ample facilities for teaching botany, chemistry, physiology, zoölogy, embryology, dairying, animal husbandry and bacteriology, and these facilities in most cases are equal, if not superior, to the facilities for teaching these subjects at most veterinary colleges.

The studies mentioned are part of the prescribed course at veterinary colleges, and students who have passed them successfully should receive due credit for the work they have done at agricultural colleges.

In a large number of states the studies of the freshman and sophomore years are nearly the same for all courses, and elective studies are given in the following years for junior and senior students. There is in about half of the colleges an opportunity for students to elect and specialize in animal husbandry or veterinary science. The aim of the colleges in the main is to devise courses with special reference to the needs of the stockman or farmer, and not to fit them for veterinary colleges, and some persons believe it is not the province of agricultural colleges to train veterinary students. Agricultural colleges give several courses, such as "farmers' short course," "dairymens' course," etc., in which there are some lectures on veterinary science, but this committee considers only graduates of four-year courses at agricultural colleges.

The requirements for admission to agricultural colleges are satisfactory to the committee and as high if not higher than the majority of veterinary colleges, and for that reason no recommendation on that phase of the subject is considered necessary.

There is no uniformity in the strictly agricultural courses, and your committee considers that it would be impracticable to bring about uniformity in the instruction in veterinary science; in fact, it does not appear that such an attempt would be favorably received. The president of one college in a letter to a member of the committee, after commenting on the good done by this Association in standardizing the courses at veterinary colleges, expresses himself as follows:

> It is my opinion that your Association has gone far enough for the present, and if it insists on dictating the veterinary work to be offered in regular courses there will be a reaction and probably some of the good work already done by your Association may be annulled or discredited in the future.

This statement coincides with expressions of opinion received from others, although none of these opinions is as pointed and positive as the above.

In many agricultural colleges the elective system has become expanded to such an extent that a student may graduate from the colleges never having had any of the subjects that are considered prerequisite to a veterinary education, but with a baccalaureate degree he is admitted to a veterinary college with the same allowance as a graduate who has had courses in botany, zoölogy, chemistry, physics and animal husbandry. Such a student gets his degree by having taken courses in agricultural education, rural sociology, and Y. M. C. A. work, or physical training subjects that are not related very closely to veterinary science. It, therefore, appears necessary to require that graduates applying for advanced standing at veterinary colleges should submit evidence that they have had instruction in the subjects required in a veterinary college.

The information secured by the committee has been obtained by correspondence and from the published statements in catalogues and announcements of the various colleges, and no personal investigation has been made of the conditions which prevail at each college. From our investigation it appears that there are seven states which employ no veterinarian on the teaching faculty, although two of these states engage a veterinarian to deliver a series of lectures of thirty to fifty hours on veterinary science. These states are as follows: Arizona, Connecticut, Florida, New Hampshire, New Jersey, New Mexico and Rhode Island. It is evident that graduates of colleges of this group of states should not be allowed a time credit of one year for entrance to a veterinary college. In twenty-three other states only one veterinarian is employed, while in ten states more than one veterinarian gives instruction in veterinary science. In several states, while there is a veterinarian on the faculty, he does not give instruction in veterinary science but in animal husbandry, and in several states the veterinarian has charge of the department of bacteriology and gives instruction in that science as well as in veterinary science. In other states, where only one veterinarian is employed, the equipment and facilities for instruction are deemed inadequate, and it is a question whether the teaching is sufficient to qualify graduates for one year allowance at a veterinary college. At the colleges in these states the instruction in veterinary science seems to be very elementary in character, the instruction in anatomy seems to be didactic only, and apparently there are no buildings and suitable equipment for clinical instruction. This group of states may be enumerated as follows: Delaware, Idaho, Kentucky, Maine, Maryland, Mississippi, Montana, Nebraska, Nevada, Pennsylvania, Tennessee, Vermont, West Virginia and Wyoming.

There are four states (Colorado, Iowa, Kansas and Michigan) that provide a four-year course in veterinary science, and three states (Alabama, New York and Ohio) that provide a three-year course in veterinary science; while the state of Washington provides both a three-year course and a four-year course. All of these states, it is considered, give sufficient veterinary science to graduate veterinary practitioners and confer a veterinary degree.

From the above investigation your committee respectfully reports as follows:

That it is not practicable to lay down definite rules to be followed at agricultural colleges specifying the amount and character of instruction in veterinary science.

We therefore recommend that accredited veterinary colleges shall admit agricultural college graduates on the certificate plan. Each applicant should present a certificate from the proper college authorities setting forth in detail the instruction he has received in botany, chemistry, zoölogy, embryology, physiology, dairying and animal husbandry; also, give in detail the amount of instruction received in veterinary anatomy, physiology, bacteriology, and such other veterinary studies as he has pursued and passed during his attendance at the college. Credit should be allowed only for such subjects as the applicant has passed successfully.

(During the reading of the report the following discussion took place.)

Dr. Grange: Mr. Chairman, if it is proper, in order to make an explanation in regard to the attitude of the Ontario Veterinary College, concerning the previous report that has just been handed in, I would like to have the privilege of the floor. I do not want to discuss the report, only to explain the attitude, and give my reasons why the position was taken.

Dr. White: I think Dr. Grange should come before the Executive Committee with any explanation he has to make.

Dr. Grange: I was under the impression that this was the place to bring my objections.

President Mohler: Dr. Grange, the chair will be very glad to hear from you after the reading of this other report. We are now proceeding with this part of the program. The report has been called for, and Dr. Fischer has the floor.

Dr. Grange: As I understand, I will have the privilege of the floor after this paper is finished?

President Mohler: Yes, sir.

(Dr. Fischer proceeded with the reading of the report, and at the conclusion of the reading, the following discussion took place.)

President Mohler: Gentlemen, you have heard this report by Dr. Fischer; what is your pleasure regarding it?

Dr. Lyman: I move it be received and referred to the Executive Committee.

Motion seconded.

President Mohler: It has been moved and seconded that this report be received and referred to the Executive Committee. Any remarks?

Dr. Mayo: Mr. President, I am somewhat disappointed in the report of this committee, because, while I had something to do with the suggestion of the subject, it seems to me that the committee has taken an entirely different view of the matter from what was intended. After teaching veterinary science in different agricultural colleges for many years, I have found the need of suggestions not as to what was the best training to fit agricultural college men to enter veterinary colleges—that had nothing to do with the suggestion in my mind—but the point was I wanted to get from this Association an expression of opinion as to how much veterinary science should be taught a man taking an agricultural course in agricultural colleges only, and not looking to anything beyond that. It seems to me that is a very desirable thing to have. Certainly we do not want to give men a training that will send them into practice and make quacks of them, but we do want to meet the demand of farmers and stockmen for training in the care and nursing of sick animals.

I believe suggestions along that line would be welcome by practically all men who are interested in agricultural college work, strictly speaking. It was not with the view of getting the graduates fit to enter veterinary colleges, because I believe that the agricultural college course—the best training that they can give for veterinarians—is to give them a daily training in science, in natural science relating to agriculture, and leave the technical training in clinics, and strictly veterinary subjects for the veterinary colleges. That was the point, and I certainly hoped that the committee would make a suggestion that they should have so much anatomy and physiology, and make a demand for that. I do not think that it was intended to be dictatorial at all, or mandatory in any way of those colleges, but only a suggestion coming from this Association that a certain amount and such a character of work would be desirable for farmers and stock men who are graduates of agricultural colleges.

President Mohler: Any further discussion of this report on the agricultural colleges?

Dr. Reynolds: I agree very heartily with everything that Dr. Mayo has just said. I have been in agricultural college work for a great many years, and there is a need for some supervision on the part of this Association over veterinary teaching in agricultural colleges. There should be something of a statement as to what should be given in the agricultural college. The work that is done in agricultural colleges in this country varies so much, some of it I am personally very sure is not worth the time of the student taking them, for it is not fitting him for a stockman. In other schools there is altogether too much of veterinary practice given which is not warranted. We do need a new standard, and I wish especially that we might take this up and push it along in order that it may work a change in another year, and these other questions be taken up. I am not criticising at all the report we have just had from Dr. Fischer, but I am merely calling attention to the need of information, and that more work be done along this other line too.

President Mohler: Is there any further discussion? (Cries of question.) All in favor of the motion please give their consent by saying aye; opposed, no. The ayes have it and the motion is carried.

President Mohler: The Chair will now recognize Dr. Grange.

Dr. Grange: Mr. Chairman and Gentlemen, I daresay you will all be glad to know that what I have to say will be in a very few words.

The chairman of the committee stated to you a few moments ago that the Ontario Veterinary College was the only college that would not permit the committee on investigation from these United States to visit within its walls.

Now to a limited extent that is true, that is to say, I disapproved of the plan of this committee coming in and saying, "Stand and deliver, give up your books, and give up this, that and the other thing, open your class-room doors, we are going in and listen to your lectures and we are going to do this and that and the other thing."

Now in justice to that committee, they did not do it in just exactly that way; they behaved in the most gentlemanly way that any body of men could behave, according to my view, and they went away a year ago, after spending a few hours at the institution. But personally I got a report, and I thought, "Well, that is probably the last report that I will ever hear from that committee." And do you know why I denied them entrance to the Ontario Veterinary College this year? It was because, in my opinion, that committee was not doing its work fairly, was not doing its work thoroughly. And I said if the veterinary colleges of this continent are not going to be treated fairly, and the American Veterinary Medical Association is not going to be treated fairly, I do not want committees of that kind coming around, and I said to the gentleman when he was on his way, "You need not go any further unless you come with the written authority from the Minister of Agriculture; if you bring written authority to make investigation in this college, the doors will be thrown open to you, and every means will be taken to make your work pleasant and agreeable," something to that effect. I don't think that is exactly what I said, but that is what I meant.

Now I have said that this work was not done thoroughly, and that it was not done fairly. That is a kind of a charge that ought to have something behind it in order for you gentlemen to determine whether this work was done fairly by this committee.

I asked this committee, "Have you investigated all the colleges?" They said, "Yes." I said, "What about a certain college," that shall be nameless for the present? They said, "Oh, we are getting a report on that college from another committee." Is that right, Dr. Reynolds, is that statement right?

Dr. Reynolds: I don't know whether I made that statement or not, but it is true; it is the essential fact.

Dr. Grange: Very well, it is true as far as the other committee was concerned. Very well. This other committee, if my guess is right—I don't know officially—but if this other committee is the committee that I think it is, something will have to be done about the work of that committee. I do not know just how to do it yet, but it begins to look to me as if I would have to hand the work of that committee over to the public, and let the public decide whether they want their sons, yes, and daughters, too, to come to the Ontario Veterinary Colleges; they will have to be the judges. I am not canvassing for students, that is one thing. Other reasons for raising the objection to the investigations of this committee appeared in my report yesterday.

Now the question is, in my mind at all events, was I justified in stating that the work of that other committee was not acceptable to me, and I believe, as far as I went, I was right. I did not go as far as I might have done, because I try to mind my own business. But two or three days ago I received a letter from a would-be applicant for registration in the Ontario Veterinary College, and I showed that letter since I have been here, to a member of the college which I have reference to, and I said to him, "I won't go any further with this, I don't care to make a fuss, and I won't go any further with this if you will look into it." He was indignant. I said to him, "I will furnish you with the correspondence as soon as I get home, I will send it to you." And he said, "I will investigate this matter." Well that satisfied me for the time being and now I find myself this morning on this platform not keeping good faith with that man. I was in hopes he was in the room, but this question is such a serious one, as far as I am concerned, that I will have to read that correspondence. I would prefer that you do not ask me where it came from; I would rather that he settle the other part of the question, but that is for you to say, and I will read my reply.

This is dated at a certain place, and it reads this way:

"After carefully looking over the colleges, or several veterinary institutions, I had decided to go to your city; but a day or two before, a certain doctor (who shall be nameless for the present) of the faculty of a certain college (which will be nameless for the present, and which, by the way, is favorably reported on by this committee) called upon me trying to induce me to attend their school. In his arguments he made the following statements: first, "that a diploma from the Ontario Veterinary College was no better than from a correspondence course."

You know I have been flattering myself that it was.

"That it was not recognized by some states in the Union (naming one state, which will be nameless for the moment).

"Secondly, that the U. S. Government, after sending a committee of five men to classify the different veterinary colleges and veterinary institutions of learning, had placed "my" college (he doesn't say "my," I am saying that) in Class A, and the Ontario Veterinary College in Class C."

Now some of you might like to know why the Ontario Veterinary College was placed in Class C, and my answer to the question is because there was no Class D; do you see?

"He also stated they had refused admittances to thirty students last year who had spent one year at Toronto."

My, what a lovely institution that must be; why, their wings are growing I think.

"Now if the statements are true, I want to change my choice, and if not true, and made by him simply to misrepresent your college, and thereby gain a student, I certainly would not want a diploma bearing the signature of a man of such a character. As the time is growing short before college opens, I will appreciate an early reply setting forth the standing a diploma from the O. V. C. would give me in this country if I should aspire to a state or government position.

"Awaiting your early reply, etc."

Now there is one thing about this communication that puzzles me a little bit, and that is that the man signed it with a typewriter. I don't know what that means, and this is the way I replied in substance.

"Dear Sir: In reply to yours of recent date, it is not my practice to notice anonymous communications, and as yours was not signed, except in typewriting, I regard the information reported as unworthy of discussion at this time.

"I might have added that if such tactics for obtaining students were adopted by any member of *our* faculty or other person connected with this college, his appointment would, in my opinion, not be worth the paper upon which it is written, as it would mean a severe reprimand or immediate dismissal.

"I send our latest calendar under another cover."

Now, after all that, was I justified in making the report I did yesterday from this committee on intelligence and education? Was I justified in saying what I have said today? Am I justified in barring this committee from coming and saying "stand and deliver, deliver up your books, etc.?" Why, gentlemen, I never worked under the lash yet, and I am too old to begin now.

I have to thank you for your attention.

Dr. M. H. Reynolds: Mr. Chairman: Dr. Grange in his remark brought out one point that I think perhaps should be explained to the Association, and as chairman of the committee I presume that it falls on me.

Do you remember he referred to the fact that the information concerning one institution had been accepted by your committee of last year through some other committee. That is the part that I think it is perhaps worth while to explain to you.

You remember that a certain definite fund was set aside for the work of the committee last year. The chairman met us in Chicago, and canvassed the situation very carefully, figured up the available funds and the cost of transportation and mileage and that sort of thing, and concluded that it would be wiser to expend the available sum in personally inspecting each particular section, than spending a very large part in inspecting one school especially, We had opportunity to avail ourselves of the services of the federal committee, Dr. Farrington and Dr. Hickman, who were soon to make a trip to San Francisco for that purpose, for it is the San Francisco school that I presume Dr. Grange has reference to. The understanding of our committee was that this was the only opportunity of inspecting the San Francisco school, and it did not look wise to us to go out there, when the federal committee from the Bureau of Animal Industry was going there anyway, and they had very kindly agreed to follow our outline and get the information that we desired and transmit it to us. In addition to that, we had the entire approval of Dr. Brenton, then President of the Association, for that procedure.

Dr. Grange: I wish to say that Dr. Reynolds' remarks fall in with what I stated yesterday in my report on this investigation. They had not money enough to buy a ticket, and they consequently had to fall back on another committee. If I was to report to you on the work of that other committee, I don't know what you would say, I don't know what the public would say. I am indignant. I have told them they cannot come back except under certain circumstances. We are trying to give veterinary education, we are trying to educate men ready to go into practice, and the students are making me believe that we are doing it. I have said all I have to say.

Dr Dunphy: Mr. Chairman, as a member of the Committee on College Investigation, perhaps it might be well for me to say just a word in regard to the matter that has come up. I have the most profound respect for Dr. Grange, and I have the most profound respect for the Ontario Veterinary College, being one of the alumni of that college. At the same time, when in a position of this kind, I want it distinctly understood that I know no relations, I have no relations in the business. We could not make a report any different from what we did in regard to the Ontario Veterinary College, for the simple reason, as we stated in our report, that we were declined the favor of investigating that college without getting a letter from the Minister of Agriculture in Ontario.

Now we are somewhat in the position that Dr. Grange is himself. We do not care to come under the lash, we do not care to get down on to our knees to any official, provincial or state official, and ask them, "Please, sir, can we go and investigate your institution?" when we have the authority and request from this Association to do so.

Now this matter in regard to the letter from this other college does not pertain to this question at all. The attitude of Dr. Grange today in regard to that letter, if the writer of that letter is a member of this Association, should be this: Charges should be preferred against that man at once, and I question whether he would be considered a year from now a member of this Association.

As far as the way that we approached colleges, there was no "stand and deliver" about it; there was no necessity.

We went to those colleges in a quiet, gentlemanly way and stated why we were there, and I do not believe that it was our province to notify a college a few days ahead that we were coming to that institution, unless we were going to take a photograph of the faculty and students, and wanted them to have time to tog out. We were not doing that kind of business; we were there doing our duty laid out for us to do by this Association, and I believe we would not have been honest and fair to the different institutions if we had notified them a week or two weeks or a month ahead to get ready for our investigation.

President Mohler: I don't think the discussion should proceed any further. At this time I wish to announce that there will be a special pathological exhibit of fresh meat inspection specimens at Fortieth Street and Eleventh Avenue at 4 o'clock this afternoon. Those interested in this line of veterinary work will find a particularly instructive display.

Secretary Marshall: I have a letter of solicitation sent by one of our honorary members, Professor Perrincito of Italy.

I have also received a telegram from Dr. Evans of Chicago as follows: "Will be with you Thursday evening and Friday morning," so we will be anticipating the address from Dr. Evans on Friday morning, as well as his presence at the banquet on Thursday evening.

Any member having any resolution to submit, will kindly refer it to the Secretary so he may take it up with the Chairman of the Resolutions Committee.

PRESIDENT MOHLER: The next order of business is the report of the Committee on Nominations. Is the Chairman ready with his report?

DR. WILLIAMS: Mr. President and gentlemen of the Association. Your Committee on Nomination, after due consideration, begs to submit its report, placing the nominations for the various offices in alphabetical order, without comment.

PRESIDENT MOHLER: Gentlemen you have heard the report of the Nomination Committee, what is your pleasure with reference to it?

DR. GILL: It seems to me the resolution presented at the last meeting by Dr. Ackerman, very materially affects the nominations of this Association. For the sake of information I would like to know just exactly what has been done with that resolution by the Executive Committee. It seems to me that, as to the requirements of the Constitution and by-laws, the fact that this resolution was printed is sufficient notification to the members of its existence and the purpose of the changes. I have not heard it reported by the Executive Committee. It seems to me that that resolution has taken precedence of the Nomination Committee.

PRESIDENT MOHLER: It is before the Executive Committee where it was placed last year, and has not come out of the Executive Committee as yet. Therefore it is not before the convention at the present time.

DR. GILL: Mr. Chairman, I propose a resolution that this report of the Nomination Committee be deferred until we can ascertain from the Executive Committee as to the disposition of the resolution presented by Dr. Ackerman, and duly seconded and passed at the last meeting of this Association in Indianapolis.

DR. MACKIE: I second the motion.

DR. WILLIAMS: The motion is out of order. The report has already been submitted, and cannot be deferred. Perhaps some other motion may be in order, but I don't see how you can defer a report that has been made. They can lay it on the table if they desire perhaps.

PRESIDENT MOHLER: Dr. Williams is correct and thus far there has been no motion made to accept the report.

DR. GILL: Mr. President, I move you then that the report be laid on the table.

PRESIDENT MOHLER: Is that satisfactory to you, Doctor Mackie?

DR. MACKIE: Yes, it is satisfactory and I second it.

PRESIDENT MOHLER: You have heard the motion to lay the report of the Nomination Committee on the table.

DR. STEWART: Is that debatable?

PRESIDENT MOHLER: A motion to lay on the table is not debatable. All in favor of this motion say aye, opposed no. There seems to be a division. I shall call for a rising vote on this motion. All in favor of the motion please rise—

DR. MAYO: I would like to ask, before I vote on this motion, what the object or the intent of the resolution was that was introduced last year, because I don't recall it now.

PRESIDENT MOHLER: Perhaps the Secretary can tell you.

SECRETARY MARSHALL: Mr. President and Gentlemen, the proposed amendment offered by Dr. E. B. Ackerman is as follows: "Mr. President, I have an amendment to offer. I move that Section 12 of Article VII of the by-laws be stricken out, and the following language be substituted therefor, so when amended it will read, 'all nominations for office in this Association shall be made from the floor.'"

PRESIDENT MOHLER: Is that satisfactory, Dr. Mayo?

DR. MAYO: Yes.

DR. STEWART: Mr. President, I would like to rise for an explanation, if it is permissible. I will say that the Executive Committee considered this proposal of the amendment to the by-laws along with two other proposed amendments, and knowing that we had a Committee on Reorganization to report looking to the entire change in our by-laws of the Association, it was moved, seconded and passed to defer consideration of all of those proposed amendments until we could hear and act upon the report of the Committee on Reorganization.

PRESIDENT MOHLER: The chair will call for the vote. The motion is to lay on the table the report of the Nomination Committee just read. Those in favor of this motion please rise and be counted. Please be seated. Those opposed will rise and remain standing until counted. The vote stands 59 for the motion and 45 against. The motion to lay on the table is carried.

Inadvertently there was no place reserved on the program for the report of the Committee on Reorganization, but I will call for the report of the chairman at this time. The Secretary, I believe, has the report.

SECRETARY MARSHALL: This report was received from Dr. Salmon too late to be listed on the official program.

I have two other reports from members of that committee, but they are more in the form of constitution and by-laws submitted for inspection.

REPORT OF COMMITTEE ON REORGANIZATION OF ASSOCIATION

D. E. SALMON, Chairman
JAMES LAW D. M. CAMPBELL
GEORGE H. HART C. J. MARSHALL

Mr. President and Gentlemen:

As chairman of the Committee on Reorganization, I beg to submit the following report:

The majority of the committee is of the opinion that a reorganization based upon the plan adopted by the American Medical Association is desirable; but the chairman finds in endeavoring to draft the amendments to the Constitution and By-laws which would be required for such a reorganization, that a very careful study of the details of the plan and a deliberate exchange of views are necessary.

The following general propositions are, therefore, submitted with the suggestion that they be acted upon by the Association and if the action is favorable to a reorganization on these lines, that a committee be appointed to work out the details and report a draft of constitution and by-laws at the next meeting.

House of Delegates. That an administrative body known as the House of Delegates be created, consisting of not to exceed one hundred and twenty members, exclusive of the Board of Trustees; two delegates to be elected by each of the sections of the A.V.M.A., one delegate to be appointed by the Chief of the United States Bureau of Animal Industry, one by the ranking officer of the Veterinary Department of the United States Army and one by the Veterinary Director General of Canada; the remainder to be apportioned every third year by the House of Delegates among the constituent Associations in proportion to their actual active membership. Delegates and alternates to hold office for one year and no one may serve as a member of the House of Delegates who has not been a member of the A. V. M. A. for at least two years immediately preceding the meeting of the session at which he is to serve. The House of Delegates should represent the delegated power of the members of the A. V. M. A. and be the national representative body of the constituent Associations. It should elect the general officers of the Association and a board of *nine* trustees, and should transact all general business of the Association of a public, professional, scientific and other nature, not otherwise provided for.

The trustees should be members of the House of Delegates without the right to vote, and no trustee should be permitted to represent a constituent Association, Scientific Section of the A. V. M. A., the Bureau of Animal Industry, the Veterinary Department of the United States Army or the Canadian Government.

Constituent Associations. State and Territorial Veterinary Medical Associations, including that of the District of Columbia and of the insular possessions of the United States, and the Provincial Associations of Canada, which are organized in accordance with a plan to be adopted by the A. V. M. A. and which have declared by resolution their allegiance to the A. V. M. A. and which shall agree to the perpetuation of the House of Delegates of the A. V. M. A. shall be recognized as constituent Associations on acceptance of their applications for recognition by the House of Delegates.

Membership. The membership of the Association shall consist of such members of the constituent Associations and of such veterinary officers of the United States Bureau of Animal Industry, of the Army and of such veterinary officers of the Dominion of Canada as shall make application in accordance with the by-laws of this Association: *Provided,* that Veterinarians residing in states or provinces where no regularly organized Veterinary Medical Association exists may make application in their own handwriting upon the application blanks of the Association, if duly vouched for by two active members of the Association in good standing resident in the Applicant's State or Province, or by the President and Secretary of the Association.

Officers. The general officers of this Association shall be a President, five Vice-Presidents, a Secretary and Treasurer, to be elected annually and to serve for one year or until their sucessors are elected and installed.

No member of the House of Delegates should be eligible to the office of President.

Board of Trustees. The Board of Trustees should have charge of the property and the financial affairs of the Association. Three trustees should be elected annually by the House of Delegates each to serve for a period of three years, except at the first election when three should be elected for one year, three for two years and three for three years.

Funds. Funds shall be raised from the regular initiation and membership fees as provided for in the by-laws, from the Association's publications, and in any other manner recommended by the Board of Trustees and authorized by the House of Delegates. Funds may be appropriated by the Board of Trustees to defray the necessary expenses of the Association; to enable standing committee to fulfil their respective duties and to conduct their correspondence, to encourage scientific investigations by the giving of prizes and awards of merit; to carry on its publications, and for any other purpose recommended by the Board of Trustees and authorized by the House of Delegates.

Sections. In order to systematize the scientific work of this Association, there shall be formed sections, each of which shall be devoted to one of the recognized branches into which the science and art of veterinary medicine are for convenience divided. New sections may be created or existing sections discontinued at any time by the House of Delegates. The sections which seem most indicated for the present are:

1. Practice of Veterinary Medicine.
2. Veterinary Surgery.
3. Therapeutics, Pharmacology and Physiology.
4. Comparative Pathology and Bacteriology.
5. Veterinary Sanitary Science and Police.
6. Animal Husbandry.
7. Association of Veterinary Faculties and Examining Boards.

Annual Sessions. The Association shall hold an annual session at a time and place to be fixed by the House of Delegates. The time and place of the session may, however, be changed by the unanimous action of the Board of Trustees at any time prior to two months of the time selected for the session. The annual session may be held at any place in the United States or Canada.

The principal modifications of the plan of the American Medical Association which have been introduced in this report are as follows: The House of Delegates is limited to one hundred and twenty (120) members instead of one hundred and fifty (150). The smaller number is sufficient to permit an apportionment which shall have some relation to the size of the constituent Associations without being too large.

Two delegates are given to each section of the A. V. M. A. instead of one as in the American Medical Association, because we will have but seven sections while they have fifteen. The proportional representation of the sections in the House of Delegates is, therefore, no greater with two delegates than there is with one.

In the plan of the A. M. A. no member of the House of Delegates is eligible to the offices of President and Vice-President. In the plan herein proposed the delegates are eligible to the office of Vice-President but not to that of President. This appears a sufficient safeguard and avoids a possible inconvenience in selecting Vice-Presidents.

In regard to funds, the A. M. A. permits the Board of Trustees to raise and appropriate money in any manner and for any purpose which the board approves. This seems to be too much latitude to give to such a board and consequently, we provide that when funds are to be raised in an unusual manner or expended for extraordinary purposes it must be done on the recommendation of the board and with the authorization of the House of Delegates.

In drafting a constitution and by-laws to conform to this plan many modifications of the constitution and by-laws of the American Medical Association should be made but these are details which need not be specified until the Association has decided to adopt the plan which is here outlined and recommended.

All of which is respectfully submitted.

D. E. Salmon, Chairman.

SUPPLEMENTAL REPORT

By George H. Hart

Mr. President and Fellow Members:

As a member of the Committee on Reorganization, and knowing that I will not be able to be present at the meeting in New York, I am taking the liberty of sending you a minority report which contains some of the ideas of the profession in California who have taken considerable interest in the matter. Inclosed you will find a resolution on the subject, passed by the California Association at its annual meeting in June; also a rather extensive number of "Suggested Amendments to the constitution and by-laws of the American Veterinary Medical Association." These were gotten up by the Committee on American Veterinary Medical Association Affairs of the California Association, of which Dr. Archibald of Oakland is the most active worker, merely with the idea of having something definite down on paper which could be changed in whole or in part.

SUGGESTED AMENDMENTS TO THE CONSTITUTION AND BY-LAWS OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION

CONSTITUTION

House of Delegates

There shall be an administrative body known as the House of Delegates of the American Veterinary Medical Association. It shall consist of delegates elected by the sections of the A. V. M. A., by recognized Associations of all states, provinces and insular possessions, and appointed by the Chief of the United States Bureau of Animal Industry, the Veterinary Director General of Canada, and the ranking officer of the Veterinary Department of the United States army. It shall represent the delegated power of the members of the American Veterinary Medical Association and shall be the national representative body of the constituent Associations. It shall elect the general officers of the Association and a board of nine trustees and shall transact all general business of the Association of a public, professional, scientific and other nature, that is not otherwise provided for.

Sections

In order to systematize the scientific work of this Association there shall be formed sections, each of which shall be devoted to one of the recognized branches into which the science and art of veterinary medicine and surgery are for convenience divided. New sections may be created or existing sections discontinued by the House of Delegates.

Annual Session

The Association shall hold an annual session at a time and place to be fixed by the House of Delegates. The time and place of session may, however, be changed by the unanimous action by the Board of Trustees at any time prior to two months to the time selected for the session.

Officers

Section 1. The general officers of this Association shall be a President five Vice-Presidents, a Secretary and Treasurer.

Sec. 2. These officers with the exception of the Secretary shall be elected annually by the House of Delegates to serve for one year or until their successors are elected and installed.

Sec. 3. The Secretary shall also be elected by the House of Delegates and shall hold office for five years, or at the pleasure of the House of Delegates.

BOARD OF TRUSTEES

SECTION 1. The Board of Trustees shall have charge of the property and of the financial affairs of the Association.

SEC. 2. Three trustees shall be elected annually by the House of Delegates, one from each of nine trustee districts, containing approximately equal numbers of members, and to be so apportioned that the terms of three trustees expire each year.

FUNDS

Funds shall be raised from the regular initiation and membership fees as provided for in the by-laws and from the Association's publications. Funds may be appropriated by the Board of Trustees to defray the necessary expenses of the Association, to enable standing committees to fulfil their respective duties and to conduct their correspondence, to encourage scientific investigations by the giving of prizes and awards of merit; to carry on its publications, and for any other purpose approved by the Board of Trustees or recommended by the House of Delegates.

AMENDMENTS

The House of Delegates may amend any article of this constitution at any annual session, provided that the proposed amendment shall not be acted on until the next annual session following that at which it was introduced and providing that three-fourths of the voting members of the House of Delegates registered at the session at which action is taken vote in favor of such change of amendment.

HEADQUARTERS

The headquarters of the American Veterinary Medical Association shall be in the City of Chicago, State of Illinois, U. S. A.

BY-LAWS

REGISTRATION

SECTION 1. No member shall be eligible to register at an annual session until he has paid all of his current indebtedness.

SEC. 2. No member shall take part in the proceedings of the Association or of any of the sections until he has registered his name and address in the registration office.

SEC. 3. A member on registering shall designate the section in which he wishes to be enrolled, but no member shall register in more than one section at any annual session.

Qualifications, Terms, Apportionment and Registration of Delegates

Section 1. No one shall serve as a member of the House of Delegates who has not been a member of the American Veterinary Medical Association for at least the two years immediately preceding the meeting of the House of Delegates at which he is to serve.

Sec. 2. Delegates and alternates from constituent Associations shall be elected for one year. Constituent Associations shall be entitled to one delegate and one alternate. Delegates and alternates elected by sections, or delegates appointed from the United States Bureau of Animal Industry, the Department of Agriculture of the Dominion of Canada and the United States Veterinary Army Corps shall hold office for one year.

Sec. 3. Each Delegate before being seated shall deposit with the Committee of Credentials a certificate signed by the President and Secretary under the seal of the constituent Association stating that he has been legally and regularly elected a delegate to the American Veterinary Medical Association. Each delegate from a section shall present credentials signed by the chairman and secretary of the section which he represents. Each delegate from a government service shall present credentials from the ranking officer of the department which he represents.

Sec. 4. The credentials of a delegate having been accepted by the Committee on Credentials and his name placed on the roll of the House, he shall remain the duly accredited delegate of the body which he represents until final adjournment of the session and his place shall not be taken by any other delegate or alternate.

Procedure of House of Delegates

Section 1. The following shall be the order of business unless otherwise ordered:

1. Call to order by the President.
2. Roll-call.
3. Reading and adopting of minutes.
4. Reports of officers.
5. Reports of committees.
6. Unfinished business.
7. New business.

Sec. 2. No new business shall be introduced into the House of Delegates after the second day of the annual session (third day of the House of Delegates) unless with unanimous consent, and such new business whether in the form of a motion, a resolution or a memorial shall require a two-thirds affirmative vote for adoption.

Sec. 3. The House of Delegates shall be governed by Roberts' *Rules of Order* when not in conflict with these by-laws or with the rules of the House.

Sec. 4. Twenty voting members of the House of Delegates shall constitute a quorum for the transaction of business.

MEETINGS OF THE HOUSE OF DELEGATES

SECTION 1. The House of Delegates shall meet annually on the day preceding the opening of and at the same place as the annual session of the Association.

SEC. 2. Special session of the House of Delegates shall be called by the President on written request of at least twenty-five delegates. When a special session is called by the President, the Secretary shall mail a notice to the last known address of each member of the last House of Delegates at least twenty days before such special session is to be held, in which notice shall be specified the time and place of meeting and the objects of such special session. No other business shall be transacted at the special session than that specified in the call.

NOMINATION AND ELECTION OF OFFICERS, ASSOCIATE AND HONORARY MEMBERS, INSTALLATION OF OFFICERS

SECTION 1. *Nominations.*—Nominations for officers shall be made orally, but a nominating speech must not exceed two minutes.

SEC. 2. *Method of Holding Elections.*—All elections shall be by ballot, and a majority of the votes cast shall be necessary to elect. In case no nominee receives a majority of the votes on the first ballot, the nominee receiving the lowest number of the votes shall be dropped and a new ballot taken. This procedure shall be continued until one of the nominees receives a majority of all the votes cast, when he shall be declared elected.

SEC. 3. *Time of Election.*—The election of officers shall be the first order of business of the House of Delegates after the reading of the minutes on the afternoon of the third day of the annual session.

SEC. 4. Nominations for honorary membership shall be made by the sections and must be submitted to the House of Delegates not later than the second day of the annual session. These applications and nominations shall be referred without debate to the Committee on Sections and Section Work, which shall consider the scientific attainments and professional character of the applicants and report to the House of Delegates. The election of honorary members shall immediately follow the election of officers. Not more than three honorary members shall be elected in any one year.

SEC. 5. *Installation.*—The general officers of the Association, except the President, shall assume their duties at the close of the last meeting of the annual session at which they are elected.

SEC. 6. *Installation of the President.*—The President shall be installed at the general meeting of the annual session following that at which he was elected.

DUTIES OF OFFICERS

SECTION 1. *Treasurer.*—The Treasurer shall be the custodian of all moneys, securities and deeds belonging to the Association which may come into his possession, and shall hold the same subject to the direction and disposition of the Board of Trustees. He shall give to the Board of

Trustees a suitable bond for the faithful performance of his trust, and shall receive for his services a salary to be fixed by the Board of Trustees.

SEC. 2. *Officers to Complete Business of Sessions.*—All business of each annual session shall be completed by the officers (including section officers) who have served through the session.

BOARD OF TRUSTEES

SECTION 1. *Board of Trustees.*—The Board of Trustees shall have charge of all properties and of the financial affairs of the Association. At the first meeting of the board after the annual session of the Association it shall organize by electing a chairman and secretary, and the chairman shall appoint such committees as may be necessary or desirable.

It shall be the duty of the Board of Trustees to provide for and to superintend the publication of *The Journal of the American Veterinary Medical Association* and of all proceedings, transactions, and memoirs of the Association. It shall have full discretionary power to omit from the *Journal of the American Veterinary Medical Association*, in part or in whole any paper that may be referred to it by any of the sections. It shall appoint a general manager and an editor of the *Journal*, which two positions may be held by one person, and such assistants as may be necessary, and shall determine their salaries and the terms and conditions of their employment.

All resolutions or recommendations of the House of Delegates pertaining to the expenditure of money must be approved by the Board of Trustees before the same shall become effective. During the annual session of the Association the board shall hold meetings as often as may be deemed necessary by the chairman, and all matters referred to it by the House of Delegates shall be reported on within twenty-four hours, if so requested by the House. The Board of Trustees shall have the accounts of the Treasurer and of the *Journal* office audited annually, or oftener if deemed necessary, and shall make an annual report on the same to the House of Delegates, which report shall also specify the character and cost of all the publications of the Association during the year and the amount of all property belonging to the Association. In case of a vacancy in the office of Treasurer or Secretary, on account of death or otherwise the vacancy shall be filled by the Board of Trustees until the next annual session of the House of Delegates. The Board of Trustees shall fix the salary of the Secretary and of the Treasurer. Regular meetings of the Board shall be held immediately, after the annual session of the Association, and on the first Friday in the month of February of each year. Special meetings of the Board may be called at any time by the chairman, or by five members of the board, by mailing a written or printed notice to the last-known address of each trustee, at least five days before such meeting is to be held, in which shall be specified, in general terms, the object of such special meeting, and no other business shall be transacted thereat; provided, that if at any time a meeting of the board be held, at which all the trustees are present, or the proceedings of which are approved in writing by every member of the board, said meeting and proceedings shall be valid, without any previous notice having been given. Five members of the board shall constitute a quorum. During the intervals between sessions of the House of Delegates the Board of Trustees shall supervise the action of committess constituted by the action of the House.

Sec. 2. *Trustees to Control Sessions.*—The Board of Trustees shall have full control of all arrangements for the annual sessions and shall provide meeting places for the Association, House of Delegates and the various sections. It shall also have control of all exhibits. The Boards of Trustees, in their discretion, may appoint a local committee of arrangements, which shall be at all times under the control of the Board of Trustees.

Committees

Section 1. *Classification of Committees.*—Committees shall be classified as (*a*) Standing Committees, (*b*) Reference Committees, and (*c*) Special Committees. The committees shall be nominated by the President and elected by the House of Delegates, unless otherwise provided for in these by-laws. Any of these committees acting during the interval between the sessions of the House of Delegates shall be subject to the Board of Trustees. In case of vacancies in committees occurring during the interval between annual sessions the President shall have the power to appoint members to fill the vacancies until the next annual session.

Sec. 2. *Membership of Committees.*—Reference committees shall be appointed by the President from among the House of Delegates, but any member of the Association shall be eligible to serve on standing or Special Committees. All members of committees who are not members of the House of Delegates shall have the right to present their reports in person to the House of Delegates and to participate in the debate thereon, but shall not have the right to vote. The House of Delegates may recall the election of any officer or the appointment of any member of a committee at any session by a two-thirds vote of the members present and voting, provided that no motion for recall shall be acted on till the day following that on which it is introduced.

Sec. 3. *Standing Committees.*—Standing Committees shall be the following:

(*a*) Judiciary.
(*b*) Intelligence and Education.

Sec. 4. *Judiciary.*—The Committee on Judiciary shall consist of five members, who shall be nominated by the President and elected by the House of Delegates. At the first annual session one member shall be elected to serve for five years, one for four years, one for three years, one for two years, and one for one year, and thereafter one member shall be elected each year to serve for five years. It shall select a chairman from its membership. The Secretary of the Association shall be *ex officio* Secretary of the Committee on Judiciary. It shall expend money and contract debts only on the authority of the Board of Trustees. It shall keep a permanent record of its actions at its office, which shall be the headquarters of the Association. It shall make an annual report of its decisions and the results of its investigations to the House of Delegates.

The judicial power of the Association shall be vested in the Committee on Judiciary, the decisions of which shall be final and shall extend, first, to all cases arising under this constitution and by-laws; second, to all controversies to which the American Veterinary Medical Association is a party; third, to controversies (*a*) between two or more constituent associations within the meaning of the constitution, (*b*) between a constituent association and member of another association, (*c*) between members of different constituent associations.

In all cases in which the American Veterinary Medical Association or one of its constituent associations is a party the Committee on Judiciary shall have original jurisdiction. In all other cases before mentioned the Committee on Judiciary shall have appellate jurisdiction both as to law and fact, with such exceptions and under such regulations as it may adopt and publish in the *Journal*, provided that such regulations must be approved by the next ensuing session of the House of Delegates, and be officially certified to each constituent Association.

The Committee on Judiciary may, at its discretion, investigate general professional conditions and all matters pertaining to the relations of veterinarians to one another and to the public and shall make such recommendations to the House of Delegates and to constituent associations as it deems necessary.

SEC. 5. *Committee on Intelligence and Education.*—The Committee on Intelligence and Education shall consist of five members. One member shall be elected to serve one year, one for two years, one for three years, one for four years, and one for five years. Thereafter one member shall be elected each year to serve five years. The committee shall organize, shall elect a chairman and secretary, and shall adopt such regulations for the government of its actions as it deems expedient. It shall expend money or contract financial obligations only as shall be authorized in writing by the Board of Trustees.

The functions of the Committee on Intelligence and Education shall be:

1. To make an annual report to the House of Delegates on the existing conditions of veterinary education in the United States.

2. To make suggestions as to the means and methods by which the American Veterinary Medical Association may best influence favorably veterinary education.

3. To act as the agent of the American Veterinary Medical Association under instructions of the House of Delegates in its efforts to elevate the standard of Veterinary education.

SEC. 6. *Reports of Standing Committees.*—Reports of standing committees, so far as possible, shall be transmitted thirty days before the annual session to the Secretary, who shall have them printed for distribution to members of the House of Delegates.

SEC. 7. *Special Committees.*—Special committees may be created by the House of Delegates to perform the special functions for which they are created. They shall be appointed by the officer presiding over the meeting at which the committee is authorized.

Sec. 8. *Reference Committee.*—(*a*) Immediately after the organization of the House of Delegates at each annual session the President shall appoint from among its members such committees as may be deemed expedient by the House of Delegates. Each committee shall consist of five members, unless otherwise provided, the chairman to be specified by the President. These committees shall serve during the session at which they are appointed.

(*b*) To the appropriate committee shall be referred resolutions, measures and propositions presented to the House of Delegates before final action shall be taken, unless otherwise unanimously ordered by the House of Delegates.

(*c*) Each Reference Committee shall, as soon as possible after the adjournment of each meeting, if necessary, take up and consider such business as may have been referred to it, and shall report on the same at the next meeting, or when called on to do so. Three members shall constitute a quorum.

(*d*) The following committees are hereby provided:

(1) A Committee on Sections and Section Work, to which shall be referred all business relating to the sections.

(2) A Committee on Rules and Order of Business, to which shall be referred all matters regarding rules governing the action, methods of procedure and order of business of the House of Delegates.

(3) A Committee on Legislation and Political Action, to which shall be referred all matters relating to state and national legislation, memorials to Legislatures, to the United States Congress. or to the President of the United States.

(4) A Committee on Hygiene and Public Health, to which shall be referred all matters relating to hygiene and public health.

(5) A Committee on Amendments to the Constitution and By-laws, to which shall be referred all proposed amendments to the constitution and by-laws.

(6) A Committee on Reports of Officers, to which shall be referred the President's address and the Secretary's and the Trustees' reports.

(7) A Committee on Credentials, to which shall be referred all questions regarding the registration and the credentials of Delegates.

(8) A Committee on Miscellaneous Business, to which shall be referred all business not otherwise disposed of.

SCIENTIFIC WORK

General Meeting

Section 1. *Time of General Meeting.*—The general meeting shall be held at 10.30 a.m. on the first day of the annual session, and shall be presided over by the President, or in his absence, or at his request, by one of the Vice-Presidents.

Sec. 2. *Address at General Meeting.*—Before the general meeting shall be delivered the address by the President, whose recommendations shall thereupon go to the House of Delegates for action.

SEC. 3. *Order of Business.*—The order of business of the meeting shall be as follows:

1. The calling of the meeting to order by the President, or in his absence by one of the Vice-Presidents.
2. Address of welcome and response.
3. The report of the Committee of Arrangements.
4. Introduction and installation of the President elect.
5. The annual address of the President.
6. Adjournment.

SECTIONS

SECTION 1. *Titles of Sections for Scientific Work.*—The American Veterinary Medical Association shall be divided into the following sections:

1. Practice of Medicine.
2. Surgery.
3. Bacteriology and Pathology.
4. Preventive Medicine and Public Health.

SEC. 2. *Officers of Sections.*—The officers of each section shall consist of a Chairman, a Vice-chairman, and a Secretary and such other officers as the section shall deem advisable. These shall serve for one year, or until their successors are elected, and qualified; provided, that each section may elect its Secretary to serve a longer time at its discretion. Each section shall also elect annually one delegate and one alternate to the House of Delegates of the American Veterinary Medical Association to serve one year.

SEC. 3. *Election of Officers.*—The election of officers shall be the first order of business of the morning meeting of the section of the third day of each annual session. To participate in the election of any section a member must have indicated on registering that he desires to affiliate with such section, and must have recorded his name and address on the section register book. Sections may each elect a member to deliver at the ensuing annual session the oration on Practice of Medicine, the oration on Surgery, the oration on Bacteriology and Pathology, and the oration on Preventive Medicine before their respective sections.

SEC. 4. *Duties of Section Officers.*—(*a*) *Chairman:* The chairman shall preside at the meetings of the section and shall perform such duties as usually belong to such an office, or as may be provided by the by-laws of the section. He shall coöperate with the Secretary in arranging the program, and shall see that proper arrangements are made for his section at the annual session.

(*b*) *Vice-Chairman:* The vice-chairman shall assist the chairman in the performance of his duties and shall preside in his absence, or at his request.

(*c*) *Secretary:* The Secretary shall keep a record of the proceedings of the section in a book provided for such purpose; shall, with the coöperation of the chairman, arrange the program; and shall, at least thirty days before the annual session, forward it to the Secretary of the Association for insertion in the official program; and shall perform such other duties pertaining to his office as may be provided for in the by-laws of the Association or of the section.

Sec. 5. *Executive Committee.*—Each section shall have an Executive Committee, which shall consist of the last three retiring chairmen. In case of absence of a member of the Executive Committee from an annual session, the vacancy shall be filled by the chairman. The committee shall examine and pass on all papers read before the section, and shall endorse for publication only those that are of scientific or of practical value, and which will reflect credit on the section before which they were read.

Sec. 6. *Meetings.*—Each section shall hold its first meeting at 2 p.m. of the first day of the annual session, and each subsequent day at 9 a.m. and at 2 p.m. until the program is completed, or as the section may decide.

Sec. 7. *Who May Take Part in Section Work.*—Members and associate members only shall have the right to participate in the business deliberations of a section. Members and associate and honorary members and invited guests may present papers and take part in the scientific discussions.

Sec. 8. *Honorary Members.*—Each section at each annual session may at the time of the election of its officers nominate for honorary membership in the American Veterinary Medical Association a scientist of a foreign country who has risen to pre-eminence in the profession of medicine. The Secretary shall immediately notify the Secretary of the Association of such nomination.

Sec. 9. *Associate Members.*—The officers of a section may nominate for associate membership representative teachers and students of sciences allied to medicine, resident in America, not eligible to regular membership. The Secretary shall immediately notify the Secretary of the Association of such nominations.

Sec. 10. *Time at Which Titles Must Be In.*—Titles of papers to be presented to the section must be in the hands of the Secretary of the section at least thirty-five days before the first day of the annual session. With the title, the writer shall submit an abstract of the paper not less than thirty or more than one hundred and fifty words in length and an estimate of the time required to read his paper.

Sec. 11. *Length of Papers and Discussions.*—The time allowed for the presentation of a paper before a section shall be limited to twenty minutes. No one shall address a section more than once on the same subject, nor for longer than five minutes, except with the unanimous consent of those present.

Sec. 12. *Number of Papers on Program.*—The number of papers, including addresses, on the program of any section shall not exceed fifteen.

Sec. 13. *Can Present Papers Only before Two Sections.*—No member shall present a paper or papers before more than two sections at any annual session. When more than one section is to be addressed, the titles and abstracts of both papers must be submitted to the Secretaries of both sections before which the papers are to be read.

SEC. 14. *Section to Provide By-Laws.*—Each section may make by-laws for its own government, provided that they shall in no way conflict with the constitution and by-laws of the American Veterinary Medical Association.

PUBLICATION

SECTION 1. *Papers Approved for Publication.*—No paper shall be published as having been read before a section unless it has received the approval and the endorsement of each member of the Executive Committee of the section before which it was read.

SEC. 2. *Papers Must be Ready for Publication.*—Each author shall hand his paper to the Secretary of the section immediately after it is read. The Secretary shall endorse thereon that it has been read and shall hand it to the Chairman of the Executive Committee. All papers approved by the Executive Committee shall be returned to the Secretary of the section, who shall at once forward them to the editor of the *Journal.*

SEC. 3. *Papers "Read by Title."*—No paper shall be published as having been read before a section unless it has actually been read, or unless, for special reasons, when the author has been present and prepared to read the paper, the section shall unanimously vote to have it read by title.

SEC. 4. *Papers the Property of the Association.*—All papers and reports presented to a section and approved by the Executive Committee shall become the exclusive property of the Association, provided that the Board of Trustees may permit an author to publish his paper elsewhere than in The Journal of the American Veterinary Medical Association.

SEC. 5. *Official Resolutions Approved by the House of Delegates.*—No memorial, resolution or opinion of any character whatever shall be issued in the name of the American Veterinary Medical Association unless it has been approved by the House of Delegates.

MISCELLANEOUS

ANNUAL DUES

The annual dues shall be five dollars, payable in advance on the first day of January of each year, of which not less than four dollars shall be credited to the subscription for one year to the *Journal.*

ARTICLES OF INCORPORATION

The House of Delegates, at any annual session, wherever the same may be held, may instruct the Board of Trustees to make any changes in the articles of incorporation in accordance with the law which may appear desirable, or which may be made necessary by any change or amendment to the Constitution and by-laws of this Association.

Amendment to These By-Laws

These By-laws may be amended on a three-fourths vote of the House of Delegates provided that no amendment shall be acted on till the day following that on which it is introduced; except that the Board of Trustees may, by unanimous vote, make such changes, and such changes only, as may be required to adapt them to the rules and regulations of the United States postal authorities.

SUPPLEMENTAL REPORT

By D. M. Campbell

Mr. President and Members of the Association:

I favor a reorganization of the A. V. M. A. that will permit each member thereof to have an equal voice in its government and activities, whether or not it is practical for him to attend the annual meeting of the Association. Specifically I favor a plan by which—

1. All nominations for elective offices of the A. V. M. A. shall be made by mail by a direct primary, which will insure an equal geographical distribution of the nominees; that all general elections be made by mail ballot also, and that the right of each member to a voice in all matters of general policy and in all other matters shall be amply safeguarded by an uncomplicated referendum extending not only to a recall of the decisions and actions of the governing board and of the Association in convention assembled, but also to recall of all elective officers except the President and Vice-President, who shall be elected for a short term and, therefore, presumably responsive to the desires of the membership.

2. That the delegated power of this Association be vested chiefly in a board of few members who shall be chosen for a long term of years and in a manner that will make the board a permanent organization which by long experience and special aptitude and facilities, may become familiar with its manifold duties. Specifically that the territory be divided into five districts approximately equal in membership in the Association and that each district have one representative in the administrative body, which shall be known as the Board of Trustees; that its members

be elected for a term of five years and so apportioned that the term of one member shall expire each year.

3. That the offices of Secretary, Treasurer, Librarian and Chairman of the Publication Committee be combined in one known as Secretary-Treasurer, the incumbent of which shall give his whole time to the duties of his office, which he shall perform under the immediate direction of the Board of Trustees to whom he is directly responsible and by whom he is removable for cause; that his term of office be five years and he be provided with the necessary assistants and an office at the permanent headquarters of the Association which shall be established by the Board of Trustees.

4. That sections of the Association be authorized to elect their own presiding officers that they may thus secure chairmen familiar with their particular line of work and in sympathy with its aims.

Attached hereto is a detailed draft of a proposed constitution for the Association which will provide for the foregoing and which I wish to append, without reading, as a part of this report, the whole of which is respectfully submitted.

Constitution

Article I. *Name*

This Association shall be known as the American Veterinary Medical Association.

Article II. *Objects*

The objects of this Association are: To promote good fellowship; to elevate the standards of veterinary education; to cultivate medical science and literature; to enlighten and direct public opinion regarding veterinary problems of state medicine; to protect and promote the material interests of the veterinary profession and present to the world its achievements.

Article III. *Officers*

The officers of this Association shall be: a President, Vice-President, Secretary-Treasurer, five Trustees, and a Chairman of each of the sections into which the Association may be divided as provided for elsewhere.

Article IV. *Membership*

Section 1. This Association shall consist of active, associate and honorary members.

Sec. 2. Active members shall consist of those now active members of the Association and others who may be elected to active membership in compliance with the provisions of this constitution. No active members shall be exempt from the payment of dues in this Association.

Sec. 3. Associate members shall comprise those ineligible to active membership in the Association who may be elected to membership on one or more sections of the Association. Associate members shall be exempt from the payment of dues and shall have no voice in the proceedings of the Association except in the election of section chairmen. In matters pertaining exclusively to sections they shall have all the rights and privileges of active members in the section to which they belong and shall be liable for special dues levied by those sections or by the Board of Trustees upon those particular sections, and shall pay a reasonable price for the reports of the proceedings. But no associate or other member shall be a member of more than two sections at the same time.

Sec. 4. Persons who have rendered conspicuous service in veterinary medicine or allied sciences may be elected to honorary membership in this Association at any annual session provided that not more than five honorary members shall be elected in any one year and no one shall be elected to honorary membership except upon the endorsement of the Board of Trustees. Honorary members shall have all the privileges of active members, except that they shall have no vote in the Association. They shall be exempt from the payment of dues.

Article V. *Dues*

The annual dues in this Association shall be five dollars, payable in advance to the Secretary-Treasurer.

Article VI. *Elections*

Section 1. All officers of the Association shall be elected by ballot and all ballots for the election of officials of this Association, except the section chairmen, shall be by mail and shall be held as follows:

Sec. 2. The Board of Trustees shall, through the Secretary-Treasurer, send to the last-known address of each member of the Association a blank ballot containing the names of those nominated as hereinafter provided for the office or offices, and a blank space in which the voter may write the name of his choice for the office or offices, provided his choice is not among those regularly nominated.

Sec. 3. A biographical sketch of each nominee shall be transmitted with the blank ballots. Such sketch shall not exceed one hundred words in length and shall give the residence, vocation, age and schooling of the applicant and a brief enumeration of his previous service for the Association. The biographical sketch shall be prepared by the Board of Trustees or under their direction.

Sec. 4. Thirty days shall elapse between the mailing of the blank ballots and notice of the election, and the closing of the ballot, which to be counted must be returned sealed to the Secretary-Treasurer by the voters within that time.

Sec. 5. Upon the close of any ballot the Secretary-Treasurer shall turn over to the Board of Trustees the unopened ballots which shall be canvassed by the board and the result of the election announced in such manner as they shall provide.

Sec. 6. Notices of all general elections, together with the blank ballots and the biographical sketches of the nominees provided shall accompany the ballots and shall be mailed from the headquarters of the Association to each member not less than sixty nor more than ninety days prior to each annual meeting.

Sec. 7. Officials chosen in any general election shall assume the offices for which they have been chosen at the close of the next annual meeting of the Association, except for the President and Vice-President, who shall assume their respective offices at the close of the second succeeding annual meeting.

Sec. 8. The section chairmen shall be elected by ballot by their respective sections on the fourth day of each annual meeting at an hour and place to have been announced in general session on the third day of the meeting.

Article VII. *Applications for Membership*

Section 1. No applicant shall be eligible to active membership who has not been graduated from a veterinary college maintaining a course of instruction approximately equal to that outlined in B. A. I. Circular No. 150, as necessary for the preparation of veterinarians for work in the U. S. Department of Agriculture, or by a veterinary college not now in existence, which, in the opinion of the Board of Trustees, properly qualified its graduates for membership.

Sec. 2. The course of instructions maintained by the veterinary colleges, whose graduates are admitted to membership in this Association, shall be determined by a permanent committee appointed by the Board of Trustees and of which one of their number shall be chairman.

Sec. 3. Applications for active membership in this Association shall be made on blanks provided by the Association in the applicant's own handwriting and shall give all the information asked for on the blank. They shall be endorsed by two active members resident in the applicant's state, province or territory, and shall be filed with the Board of Trustees under conditions which said board shall formulate.

The Board of Trustees may at their discretion recognize as constituent Associations regularly organized veterinary Associations in any State or Province and require that applicants for membership in this Association shall be properly vouched for as members of constituent Associations in thier respective State or Province.

Article VIII. *Sections*

To facilitate its work at annual meetings, the Association shall be divided into not more than six sections, whose scope and designation and plan of organization shall be formulated by the Board of Trustees in compliance with the provisions of this constitution.

Article IX. *Qualifications of Officers*

Section 1. No one shall be eligible for nomination or election to the office of President of this Association who has not been an active member, in good standing, for a period of at least ten years immediately preceding the date of his nomination.

Sec. 2. The qualifications for the office of Vice-President shall be the same as for President.

Sec. 3. All other officers of this Association shall be active members, in good standing at the time of their nomination and election, except that associate members shall be eligible for the offices of chairmen of the sections to which they belong.

Sec. 4. Trustees must be residents of the district from which they are elected and a change of residence on the part of any Trustee to any other Trustee district shall vacate the office.

Article X. *Duties of Officers*

Section 1. It shall be the duty of the President to deliver an annual address at the opening of the annual meeting over which he is to preside, and to transmit this address and from time to time such other messages as he may deem necessary, to the Board of Trustees for their consideration; to preside at general and special meetings of the Association; appoint committees and officers whose selections are not otherwise provided for and perform such other duties not in contravention with this constitution or its laws as ordinarily devolve upon the chief executive officers of similar bodies.

Sec. 3. The Secretary-Treasurer shall devote his whole time to his office. He shall maintain an office at the headquarters of the Association, which shall be kept open during ordinary business hours, and in which be kept the library, except as hereinafter provided, and other property of the Association. He shall be custodian of all funds and property of the Association, for which he shall give a bond satisfactory to the Board of Trustees. He shall keep a record of the proceedings of all general and section meetings, and shall edit and issue all publications; prepare the program for all meetings and perform such other duties as he may be directed to perform by the Board of Trustees. He shall perform the foregoing and all other duties of the office under the immediate direction of the Board of Trustees, except in matters affecting the personnel of the board, when he shall act under the direction of the President of the Association.

Sec. 4. The Secretary-Treasurer shall be elected for a term of five years, and shall receive for his services a salary of $2500 per year.

Sec. 5. For the purpose of election of members of the Board of Trustees, the United States and the Dominion of Canada shall be divided into five districts, containing approximately equal numbers of members of this Association. These districts shall be known by number, and each district shall be entitled to one member of the Board of Trustees elected by the resident members therein.

Sec. 6. At the first election held under the provisions of this constitution a member of the Board of Trustees shall be chosen from each district. The Trustee from the first district to serve for a term of one year, the Trustee from the second district to serve for a term of two years, the Trustee from the third district to serve for a term of three years, the Trustee from the fourth district to serve for a term of four years and the Trustee from the fifth district to serve for a term of five years, and thereafter one Trustee shall be elected annually for a term of five years.

Sec. 7. In case of gross misrepresentation of this Association by any Trustee, the President of the Association may remove the offending official from office, in which case he shall immediately call an election to fill the vacancy for the unexpired term, and the Trustee so removed shall automatically become a candidate for reëlection. Such special election shall be held in accordance with the rules of the general elections, except that the Secretary in carrying out the provisions shall act under the direction of the President of the Association and shall deliver the sealed ballots to a special canvassing board appointed by the President.

Sec. 8. The Board of Trustees shall constitute the administrative body of the Association and shall make all rules and regulations for carrying into effect the provisions of this constitution.

Sec. 9. It shall establish a permanent headquarters for the Association in a city centrally located and easy of access.

Sec. 10. The Board of Trustees shall select the time and place for the annual meetings of the Association and make the necessary arrangements for holding such meetings. It shall pass upon the eligibility of all applicants for membership, and no applicant shall be elected to membership except upon favorable recommendation of the board.

Sec. 11. All resolutions presented at meetings of this Association and all matters affecting its policy shall, before they are finally acted upon by the Association, be referred to the Board of Trustees to be reported back promptly with their recommendations. In case of disagreement by the Board of Trustees and the members present at any annual or special meeting, the question at issue shall, within thirty days, be submitted by mail to the whole membership for its decision, in which case the matter, together with reasonable argument of the Board of Trustees and the argument of someone selected by the president from those apposed to the policy of the Trustees shall be mailed by the Secretary-Treasurer to each member, who may record his decision on a blank prepared for that purpose and returned sealed to the Secretary-Treasurer who shall deliver them to a special canvassing board appointed by the President. The decision of the membership shall be final.

Sec. 12. Three members of the Board of Trustees shall constitute a quorum to do business, and the decision of a majority of those present shall prevail, except that in the case of misconduct of any officer of the Association four members of the Board of Trustees shall be authorized to remove such offending officer and fill the vacancy until the next general election, provided that the Board of Trustees shall have no power to remove from office either the President or Vice-President of the Association.

Sec. 13. On the written application of fifty members of the Association, the Board of Trustees shall submit any question to a referendum of the whole membership in the same manner as is provided for the submission of a disagreement between the Board of Trustees and the members at any annual session, and the decision of the membership shall be final.

Sec. 14. The Board of Trustees may, in case of necessity, levy special assessment to raise funds for the Association and no money belonging to the Association shall be paid out for any purpose except upon appropriation by the Board of Trustees.

Sec. 15. The Board of Trustees shall appoint such special and standing committees as may be necessary to aid it in its work, but at least one member of all standing committees shall be a Trustee.

Nothing in this section shall be construed to prohibit the President from appointing such Special Committees as may be deemed necessary by the Association in convention assembled, except that two or more committees shall not be appointed for the same purpose.

Sec. 16. The Board of Trustees shall hold regular sessions quarterly, one of which shall be at the time and place of the annual meeting of the Association, and the Secretary-Treasurer shall call special meetings of the Board upon the written request of three Trustees. All regular meetings of the Board, except that held during the annual session of the Association, shall be held at the headquarters of the Association unless the board, by vote, selects a different place. Special meetings of the board shall be held at the time and place designated in the call.

Sec. 17. The Board of Trustees shall require the Secretary-Tresaurer to attend all meetings of the board, to keep an accurate record of its proceedings and such proceedings shall be published and distributed promptly to members of the Association, except such parts as may, in the judgment of the board, best be withheld from immediate publication, but notice of the disbursements of the funds and the purpose for which such imbursements were made, shall be never withheld from publication.

Sec. 18. The Board of Trustees shall act and report promptly upon all recommendations of the President of the Association as heretofore provided.

Sec. 19. The chairman of each section shall perform the usual duties of the presiding officer and, in addition, on the request of the Board of Trustees, shall assist the Secretary-Treasurer in formulating a program for the section and in the publication of the Report of thier annual meetings.

Artícle XI. *Amendments*

Amendments to this constitution may be made by a majority vote of all the members in each trustee district or by the vote of three-fourths of all the members of the Association.

Article XII. *Nominations*

Not more than sixty or less than thirty days prior to the call for any election, the Secretary-Treasurer shall, upon the direction of the Board of Trustees, send to each member of the Association a blank ballot, explaining for what offices the election is to be held, and ask such members to indicate their first choice for each of the offices and mail promptly to the Secretary-Treasurer. Thirty days shall be allowed for the return of these ballots, and at the expiration of such time such ballots as have been received shall be turned over to the Board of Trustees, who shall canvass them by districts, selecting the two candidates receiving the highest number of votes in each district as nominees, except in the case of Trustees, in which case the highest ten shall be selected for the nominees in each district.

ARTICLE XIII. *Organization*

After this constitution shall have been adopted, the President of the Association shall, within six months, appoint an Organizing Committee who, together with the Secretary, shall divide the territory into five districts, hold the first primary for the nomination of officers, call the first election, canvass the votes and take such other steps as may be necessary to put this plan into operation, provided that the first Board of Trustees, when elected, may change the boundaries of any of the districts created by the Organizing Committee, and thereafter the boundaries of these districts shall be changed only by the Board of Trustees, and not oftener than once in ten years.

PRESIDENT MOHLER: Gentlemen, the report of this committee is before the convention; what is your desire regarding it?

DR. LOWE: Mr. President, I move that the report be received and be referred to the Executive Committee.

Motion seconded.

PRESIDENT MOHLER: It has been moved and seconded that the report be received and be referred to the Executive Committee for appropriate action. Are you ready for the question? All in favor of this motion please give their consent by saying aye; opposed, no; the ayes have it, and the motion is carried.

Unless the Secretary has something further to announce, I believe we are ready to adjourn.

DR. HOSKINS: Before adjourning, I would mention especially the banquet tomorrow night, as the committee has to guarantee a certain number, and the hotel management is very anxious to have all subscribe today so far as possible so the correct number may be given.

DR. STEWART: Mr. Chairman, I wish to call the attention of those interested in the association of college faculties and state examining boards, that we still have a small part of our program to carry out, and if they will meet promptly at 2 o'clock, we will get through in time for the members to visit other sections this afternoon, and we will not take very long to complete the work.

Upon motion of Dr. Kinsley, duly seconded, it was voted to adjourn to 8 o'clock P.M.

GENERAL SESSION

Wednesday Evening, September 3, 1913

President Mohler: Gentlemen, please come to order. Dr. Blair, would you act as Secretary pro tem. until the Secretary arrives, please? I regret exceedingly that Prof. A. E. Mettam, of the Royal Veterinary College of Ireland, will not be present with us tonight, owing to pressure of professional duties on the other side. We received a letter from him some time ago in which he stated that he would make every endeavor to attend our anniversary, but he has been unable to do so.

The first order of business for this evening is the report of the Executive Committee. I will call on Dr. Stewart. (See Reports of Executive Committee, page 182.)

Dr. Hoskins: I move that the report be received and that the several recommendations be taken up seriatim. (Motion seconded and carried).

Dr. Stewart: "On motion duly seconded and passed, it was voted to recommend to the Association the passage of the following vote: 'That it is the sense of the Association that it hold its meeting for 1915 at San Francisco.'"

Dr. Hoskins: Mr. Chairman, I take it that this does not in any way bind the Executive Committee for the year 1914, because it is always the province of the Executive Committee to decide matters of that kind; it is simply the expression of the sense of this meeting, I take it.

Dr. Stewart: That is as I understand it.

Dr. Hoskins: If that is true, I move its adoption. (Motion seconded and carried.)

Dr. Stewart: "On motion duly seconded and passed, it was voted to recommend to the Association that the applicants whose names have been read for membership be admitted.

Dr. Hoskins: I move that those whose names have been favorably acted upon be admitted to membership, and, under suspension of the rules, that the Secretary be instructed to cast the ballot. (Motion seconded and carried.)

The Secretary: The Secretary reports that he has cast a ballot for the names as read by Dr. Stewart.

President Mohler: The Chair declares that these men whose names have been read are now members of the Association.

Dr. Stewart: "On motion duly seconded and passed it was voted to recommend to the Association that, beginning with the year 1914, graduates of St. Joseph Veterinary College, of St. Joseph, Mo., shall be eligible to membership in this Association."

Dr. Hoskins: I move the adoption of that recommendation.

Dr. Lyman: Mr. President, it strikes me that from the wording it would look as if it was a resolution to make it more or less continuously operative; and I should say, instead of the word "Beginning," it would be well to say merely, "Graduates of the class of 1914," rather than "Beginning with the year." I would make that suggestion.

Dr. Stewart: Mr. President, I move to amend.

President Mohler: The motion has not been seconded, so there is no motion before the house.

Dr. Stewart: The reason for wording it this way was to meet the condition found and reported by our Committee on Colleges, that the men who had matriculated in 1911 would be eligible after graduation in 1914. So as long as they continued in good standing it was meant that it should be continuous.

President Mohler: Gentlemen, you have heard the recommendation. What is your desire?

A Voice: I move its adoption. (Motion seconded and passed.)

Dr. Stewart: "On motion duly seconded and passed, it was voted to recommend to the Association that, beginning with the year 1914, graduates of the United States College of Veterinary Surgeons shall be eligible to membership in this Association."

A Voice: Mr. Chairman, I would like to ask if we have any members of this Association at the present time that are graduates of that school?

Dr. Stewart: Yes, we have.

A Voice: Then why are we admitting one and shutting out somebody else?

President Mohler: We are following the recommendation of the College Investigation Committee.

Dr. Cary: I move its adoption.

Dr. Stewart: I would like to explain to the Doctor that it has been done with several colleges, that this is not a new thing, that the Committee on Colleges found that they had come up now to the standard, and they recommend that they be admitted.

President Mohler: Dr. Cary has moved its adoption. Is there a second?

A Voice: I second the motion. (Carried.)

Dr. Stewart: "On motion duly seconded and passed, it was voted to recommend to the Association that, upon the presentation of an application in proper form, Dr. J. R. Mahaffy, of Wilmington, Del., be reinstated to membership in the Association."

The Secretary: Dr. Mahaffy tells me that this is not a reinstatement, that it is an original application. I have the application before me, properly signed.

Dr. Stewart: We misapprehended the situation. We understood that he had been a member and was seeking reinstatement. Now, the committee raised the question as to whether he should not make out a new application, and I find that the Secretary has such application.

The Secretary: His application is properly signed by the Resident Secretary of Delaware, Dr. Eves, and by the President and Secretary, as he could find no other member present from the state of Delaware.

A Voice: Mr. Chairman, I move that it be referred back to the Executive Committee. (Motion seconded and carried.)

Dr. Stewart: "On motion duly seconded and passed it was voted to recommend to the Association that the proposal of Dr. Ackerman, to amend the constitution and by-laws by striking out the whole of

Section 12 of Article 7, providing for a Nominating Committee, and substituting in lieu thereof the language, 'All nominations for office in this Association shall be made from the floor,'" be adopted.

Dr. Gill: I move you, Mr. Chairman, the adoption of this recommendation. (Motion seconded.)

Dr. Mohler: It has been moved and seconded that this recommendation be adopted. Are you ready for the question?

Dr. Hoskins: I sincerely trust that the motion for the adoption of this recommendation shall not prevail. I have had thirty long years of experience in this Association, and I have been in attendance upon every election in its history in that period of time. I well recall the difficulties that confronted us and the time consumed in making of nominating speeches on the floor for men for these various offices, and, long before I was one of that Committee, I hailed some plan by which names might be presented here for the several offices, without taking away the rights of any individual member, and the plan that was adopted was that of making the Ex-Presidents a Nominating Committee.

Surely there could be no body of men better acquainted with the membership of the Association, no body of men better acquainted with its work and its future, no body of men better able to judge from the membership those who were especially well equipped to carry on the work of this Association in its various directions; and with such men we run none of the risks that always occur when men are thoughtlessly nominated from the floor because of personal friendship, or because of college relations, or because of being members of an alumni body. It may be possible to select from the membership men representing the various sections of our country; they offered you three at least for the presidency, or five if they saw fit, or more, so that the Association might elect from those presented someone who was well equipped to carry on the work of the Association. I am quite sure that the records that have been made under that plan have not in any way militated against the welfare of this Association, or in any way lessened its progress, and with each returning year you have selected from that list submitted someone who has carried the Association on to a higher and greater progress. At the same time the freedom has existed still to make nominations from the floor by individual members. It is still the right of every member of the Association so to do. I feel quite sure, too, that in the presentation of these names a committee of ex-presidents can have but one thought in mind and that is the well-being of the Association. Any ambitions that they might have are put aside; and therefore in the selection of men they can well consider names that represent some distinct progress that has been made, or some distinct contribution that has been made to the Association's welfare or to the progress of veterinary medicine. They likewise in their selection would not allow these candidates to represent any one school or any one distinct branch of our work. The candidates that have been presented under this plan have always represented three distinct bodies within us; they have presented those who represent distinctly the schools; they have always presented someone from the field of practitioners, and someone who represents the official life in the membership of this Association. I say this Nominating Committee has served this Association very well indeed, and I think it would be wrong to change it now.

Dr. Stewart: Mr. Chairman and Gentlemen: I just wish to leave two thoughts with you: first, that the plan under discussion was evolved because it seemed as though our Association might go to pieces through the feeling that there was no choice left for the individual. Now, that meant a great deal. I have attended numerous meetings of this Association, and I have said to myself: "I believe I will never go back there again, because I have no choice in the selection of the officers." The reason I did not have any choice was that after a man who is aspiring for some office has secured an eloquent man to nominate him and make a speech, and another eloquent man to second the speech, and perhaps a third man to still endorse that nomination, there is no use in nominating anybody else. The result has been that the fellow who has been able to do this has been elected, and I have had no choice but to take the nominee first put up. Well, that is not a choice.

Then again, there was another way of stopping even making a second nomination, which was in vogue, and that was, as soon as the nomination was made and duly seconded and "thirded," for another man to jump up and say, "I move that nominations be closed," and then you couldn't make a second nomination.

That was done in my presence in this body several times in succession, and I certainly was one who made the effort to defeat it. If you go back to the old plan, rather than substitute a new and better one, you will find yourselves in the very same condition that I found myself in before; so I appeal to your judgment in this matter, and urge you to leave it so that I and you and everyone may have a choice. Now, with the present plan there have been three to five men named, and then the opportunity has been given for each individual to name another man, giving the widest kind of choice, and then there is no question but what the choice is a fair one. These are the two points I leave with you.

Dr. Hughes: Mr. Chairman and Gentlemen: I have just simply one point to place before you, and that is that this Association is permeated—I might say transpermeated—to such an extent that I believe there is a crying demand for a change. Let us have a change, gentlemen, and see how it will work.

Dr. Gill: Mr. Chairman, I would like to point out the inconsistencies in the present method of nominating candidates for the various offices. I also wish to point out the dangers that follow from the fact that the greatest number cannot be considered.

Now, we have a Nominating Committee, and we also have the privilege of nominating from the floor. The Nominating Committee, as the thing generally works out, makes up a slate, with the candidates practically selected.

The condition today as it exists is this, in my mind: A very popular candidate for one of the offices has not been mentioned by the Nominating Committee, and I feel quite sure that that candidate is going to be elected from the present indications. Why make it necessary to embarrass the

Nominating Committee by being obliged to nominate a candidate from the floor in the face of the fact that they well know that this man is going to be a candidate? It is common gossip among the members of this Association.

Now then, I say, let this be an experiment; let this resolution prevail, and let us see whether things are going to happen as have been prophesied. I think we should do the most good for the greatest number, and I think by passing this resolution we are doing that. If you will remember, those of you who were at Indianapolis when this resolution was presented, it was sanctioned by almost two-thirds of the members present. I want to call the attention of each and every member of this Association to the fact that the Executive Committee have almost unanimously recommended this.

Dr. Winchester: Gentlemen, I think you are treading on thin ice. I think Dr. Stewart has faithfully told you the condition. You may not know it, but it is a fact that certain men want to be at the head of this organization. They have worked for three and six months to get men to agree to vote for them at the meeting. Talk about politics—they have gone from one end of the United States to the other, hunting for men to qualify themselves to vote at this time. Why? They know.

We come here as members of the nominating board, and, as Hoskins has said, we have nothing to gain, we have no wires to pull out of the fire, it is for the welfare of the Association. We are today standing on the brink of the reorganization of this Association, left for the members so to do. If that is a fact, this same thing may be a part of the reorganization. We have nothing to gain; it is immaterial to me personally whether I go and stay at a conference for two hours and get together a bunch of names, and give you thirty or forty to pick from. I care not how many of you nominate your friends from the floor. But remember this: we give you those names twelve or twenty-four hours previous to the election. Can there be anything hidden in that? You have a chance then to look at the record of those men. I don't see how you can improve on that.

Dr. Smith: Mr. Chairman, I think that the time has come when we should have a change. There is not a doubt in my mind, and I don't think there is a doubt in any man's mind, but what the Nominating Committee has always exercised their good judgment, but the reason why I think we should have a change at this particular time is, that I am a progressive; and you know the first principle of a progressive is, no matter what party he belongs to, that the people should have a right to nominate. Therefore I think that the membership of this body, and nobody else, should have the right to nominate. I do not question but what the nominating board has done its work well, but I do say this, that the members themselves are qualified to pick just as good men for the high office of president or vice-president, or any other office in this Association, as the nominating board, and therefore I think that the time has come when we should have a change.

Dr. Rhoads: There seems to me to be some inconsistency in the talk. Our friend here said that there is politics in the nominating board.

Friend Gill gave us a political brick, if there has been one suggested, and it shows that there are evidently men who are not on the nominating board that are well worthy of the name of politicians. Our friend here says he is a progressive. Then why in the name of Heaven retrogress and go back fifty years? If you want to put this thing in a position to spend a day or a day and a half with some of your political brethren, and to have flowery speeches for the nomination of certain men, and, as my friend Winchester said, solicit the nomination for a long time before, then go back fifty years and have those flowery speeches, as they do in all political conventions, accompanied by all its bitter feelings and its fights. No right has been denied anybody to nominate from the floor. Is it possible to get a number of men who have the interests of the Association more at heart than your ex-presidents? Did you repose confidence in them when you elected them to that high office? There is nothing more for them; there are no other offices for them. They are certainly the men who have the best interests of this Association at heart; they are certainly the men who are best qualified to pass on the fitness of the men to be chosen as officers of this Association. Then why take this prerogative from them? Why deny them that privilege? No one can gainsay that they have done it honestly and conscientiously. You are not prohibited from nominating from the floor; you still have that privilege. I say that we are going backward if we make this change. If we are to reorganize along better lines, then let us make sure that the thing is better before we adopt it.

Dr. Lyons: Mr. President, the Gentlemen preceding me has voiced my sentiments on that matter in about the language that I was to use myself. The thing that will influence me in voting on this matter is that there is no prohibition against me or any other member of the Association nominating any candidate from the floor that he chooses to vote for. If nominations were not allowed from the floor, I might be induced to vote for the proposed amendment. I see no reason for making any change.

Dr. Ackerman: Mr. President and Gentlemen: The nominating board was made for the purpose of taking politics out of this organization, and I made this resolution last year because I felt that if there were to be any politics it ought to be politics of the whole Association and not politics of any local committee. They should not control the nominations of this body. The idea of a change was that we might better our conditions in this way, that in the future a man would be able to vote as at a primary, voting for the man of his choice as a candidate for the office, and then the two candidates receiving the highest number of votes at the primary election to be the candidates for office. I hope this resolution will prevail.

Dr. Winchester: Mr. President, I am now talking whereof I know. When I was elected President, I had the honor of being elected without a dissenting vote. Why? I stood in with the other fellows, and after we had got the three nominating speeches, we stopped any further nominations and they didn't have a chance.

Dr. Baker: Just one word. In supporting the motion to adopt the resolution, I just want to call the Association's attention to one point —political, if you please. This is a free country, ruled by a majority. We have endeavored in this country, and I presume we always will, to steer clear of paternalism. A nominating board composed of the ex-presidents assumes automatically a paternal position. I am in favor of men selected by the Association, where the strongest men win.

Dr. Maloney: I am in favor of this resolution if for no other thing than that it is founded on principles of democracy, and the voice of the people is the law of the people. We are not going to establish in this great organization a House of Lords to hand us down our officers. The men who are represented here, perhaps in greater numbers than have ever assembled before under the auspices of veterinary science, are here today to express their opinion, to express it individually, and not the cocked and primed order of a few men who assume to themselves the rights of primogeniture. Every man here is interested in his profession; every man here is as much interested in the progress and the uplift of his profession as any set of men can be who assume to themselves rights and privileges because they have been honored by being presidents of this organization. I hope that this resolution will pass, and that every man will have his right to put in nomination any man that may be his choice. Every man may aspire to this high office. It is a great thing that men will take the trouble and go to great ends to get this great position. There is nothing that can be said against a man for aspiring to the greatest office within the gift of his people. I hope that the resolution will pass and that the nominations may be made from the floor, every man making his own choice.

Dr. Babb: No man in this body has the interests of this organization more at heart than I. There is no member here that desires to have a voice in the selection of its officers more than I do; but if the gentlemen who first brought forward this resolution a year ago had put into it the plan that he spoke of tonight, that he intended to do, it would have put an altogether different light on the proposition. The motion now before us is a backward step, far more backward than anything I can conceive of.

Now, one of our members has expressed himself as being a progressive. I am a progressive myself. I would like to see some progressive system for nominations, but this is not progressive by any means; it is retrogressive. And rather than retrograde, I say let us continue what we have, or, better still, let us put into operation your primary scheme, which will be true progression. This is not going to give you your primary scheme at all. It is going to be bad, just the same as it is in all organizations of this kind where you nominate from the floor; you do not get what you want.

Dr. Mohler: Gentlemen, the time is fleeting. Let us hurry along.

Dr. Leech: Mr. President, I just wish to call the attention of the body to two facts: we have had some very noisy speech-making here tonight, objecting to this resolution being adopted; and I would like to ask you to consider whether those very men who have made the noisiest speeches on the floor have not been your presidents and ex-presidents, elected by the system we are asking for now, and if they have been any damage to this Association because they were chosen in that manner?

I do not yet believe that we can lose confidence in the people. We have a body of people here who, I think, are able to select for themselves. The system which has been suggested by Dr. Ackerman, of voting for those who would be the choice of your members and those receiving the highest number of votes for the different offices being declared elected, would be just as fair as any recommendation we could get from a nominating committee. I believe we should accept this resolution and put it on that basis. It would be much more fair than to be in the hands of a body of ex-presidents making nominations, who will continue from year to year on that board and will be able to fix the slate to suit themselves.

(Cries of "Question".)

Dr. Mohler: Gentlemen, the question is on the adoption of the recommendation to do away with the nominating committee.

A Voice: Mr. Chairman, I move you that a vote be taken by reading the list of members registered.

Dr. Mohler: There is a motion before the house; you are out of order. Are you ready for the question? (Cries of "Question.")

All in favor will please arise. The Secretary will count the vote. Those opposed to this motion will please rise.

The motion is carried.

Dr. Hoskins: Mr. Chairman, I call for a division and that the members shall pass up here and give their names and have their votes recorded.

A Voice: You are defeated.

Dr. Hoskins: I insist upon my rights for a division and a recording of the vote.

Dr. Mohler: A division is called for, and I shall ask the gentlemen that voted in favor of the adoption of the recommendation to form and come past me, giving their names or exhibiting their membership badges, or otherwise being recognized as members of the Association.

Dr. Maloney: I appeal from the decision of the Chair.

A Voice: I second the motion.

A Voice: I would move you, sir, that the vote be reconsidered, and after it is seconded we will see then whether we are in the hands of politicians.

A Voice: Mr. President, as I understand parliamentary rules, anyone calling for a division can insist upon it.

Dr. Mohler: That is what the Chair rules if the gentleman insists in his call for a division. The count was 155 in favor of, and 52 against the recommendation of the Executive Committee.

A Voice: Mr. Chairman, have you got two-thirds in favor of that? It takes two-thirds, as I understand it.

Dr. Mohler: Yes, there is considerably more than two-thirds.

A Voice: Mr. President I would like to ask if there are men in here who do not belong to the Association. I know there are.

A Voice: Do you know that they voted?

A Voice: I don't know anything about that.

Dr. Maloney: Mr. Chairman, I move that we proceed with the next order of business.

A Voice: I second that motion.

Dr. Mohler: The motion to proceed with the regular order of business is before us and has precedence.

Dr. Gibson: Mr. President, as a member of the minority voting upon the question, I move the vote be made unanimous.

Dr. Cahill: Mr. President, I move that every man voting upon this question be proved to be a member.

Dr. Mohler: The motion to proceed with the next order of business of the day is privileged and has precedence. It has been moved and seconded that we proceed to the regular order of business which is not debatable. Is the Convention ready to vote? (Cries of "Question.") All in favor please say aye; opposed, no. The ayes have it.

The next order of business is the acceptance of the report of the Executive Committee as a whole and the Chair will entertain a motion to that effect.

Dr. Lyman: Mr. President, I move to accept the report as amended. (Motion seconded and carried.)

Dr. Mohler: I now call for the report of Dr. Mayo, as Chairman of the Special Committee on Advertisements of Veterinary Remedies.

REPORT OF THE COMMITTEE ON ADVERTISEMENTS OF VETERINARY REMEDIES

N. S. Mayo, Chairman
C. A. Cary S. B. Nelson

Gentlemen of the American Veterinary Medical Association:

Your committee began its work by sending the following letter to the editors of all the agricultural and live-stock papers published in the United States and Canada.

Dear Sir: A desire has been expressed by the editors and publishers of some of the leading agricultural and live-stock journals to use their best endeavors to protect their subscribers by excluding from their columns advertisements of veterinary remedies for which false and fraudulent claims are made.

In order to meet the wishes of those editors and publishers who desired technical assistance in deciding as to what may be proper claims for veterinary remedies, the American Veterinary Medical Association has appointed a committee on Advertisements of Veterinary Remedies, consisting of Dr. C. A. Cary, of the Alabama Agricultural College and Experiment Station, Auburn, Ala.; Dr. S. B. Nelson, of the Washington Agricultural College and Experiment Station, Pullman, Wash.; and

Dr. N. S. Mayo, of the Virginia Polytechnic Institute and Virginia Experiment Station, Blacksburg, Va. This committee will be glad to assist in any way it can to protect the farmer and stockman from being swindled by the many fraudulent veterinary remedies that are so extensively advertised in the agricultural and live-stock papers. Can we count on your valuable coöperation and assistance in this important matter? We should be glad to hear from you upon this subject.

Yours truly,

The object of this letter was to create an interest in this subject, to get an expression from as many editors as possible and to inform them that this Association was interested in checking these frauds that prey upon the farmers and stockmen.

The replies received were varied and interesting. Some expressed thorough sympathy with the idea and are making an honest effort to free their advertising columns from these jokes. Others approved the suggestion but continued the evil tenor of their way. Others, and among them some of the most influential papers of the continent, paid no attention to our letters; while others asked for a list of fraudulent remedies and a few submitted advertisements and asked the committee's opinion.

Your committee found itself in something of a dilemma. While I believe no member of the committee ever shirked a fight, we did not feel like inviting one by charging that remedies for which false claims were made were frauds, as by so doing we would be personally responsible in a suit at law with the necessary annoyance and expense. I might make an exception with reference to advertisements of the London (Ontario) Veterinary Correspondence School. We have succeeded in having the advertisements of this concern eliminated from all periodicals where we have found it.

We then tried moral suasion by clipping advertisements from papers and sending them with a personal letter to the editors, stating that we were aware of the high standard of integrity of the paper and asked them if they really believed certain claims made in the advertisements. This has proved of some value.

The income from advertisements is one of the most important sources of revenue of agricultural and live-stock papers. Without this many would die of inanition. This would doubtless be a public benefit in most cases, but it is difficult to convince the owner and publisher of it.

The editor of one of the leading agricultural papers of the

South, an honored member of this Association, told me that the exclusion of all questionable advertisements from their columns had cost them thousands of dollars annually. In many periodicals the business management is entirely independent of the editorial.

It has been the policy of this committee to avoid antagonizing the press but to assist them by pointing out the errors of their advertising columns.

Another letter as follows was sent out:

To the Presidents of Agricultural Colleges and Directors of Experiment Stations.

Dear Sir: The Committee of the American Veterinary Medical Association on Advertisements of Veterinary Remedies is endeavoring to protect farmers and stockmen from fraudulent veterinary remedies. We find that some proprietary preparations claim to be "endorsed by the leading agricultural colleges and experiment stations." One simple remedy that is extensively advertised and sold at an exorbitant price appears to have testimonials from persons remotely connected with colleges and experiment stations.

Agricultural colleges and experiment stations stand for truth and integrity, and have the confidence of farmers and stockmen; for this reason manufacturers of proprietary preparations are desirous of getting letters of some sort from college or station employes which they can distort into an endorsement of their preparation and be better able to foist it upon the farmer or stockman.

Dr. E. W. Allen, of the United States Department of Agriculture, Office of Experiment Stations, says:

"The Office of Experiment Stations has always maintained that it was not the business of the stations to advertise or promote proprietary feeds and stock remedies, or indeed any special manufactures; and as public institutions, they should exercise great care in giving any endorsement which would confer advantage on any particular firm. As such endorsements would involve the name of the institution, they should not be given without the approval of the president or director."

This committee would suggest to college and station authorities that testimonials as to proprietary veterinary or stock remedies should only be given after a thorough and careful test by well qualified men, and that such testimonials should be submitted to and approved by the President or Director to be official.

Will you please advise the chairman as to the attitude of your institution in regard to this matter?"

A hearty response has been received from every college and experiment station save one and that one has been a serious offender. I am glad to report that a new director for this station has been installed who promises a different policy.

We have also sought the aid of the Bureau of Chemistry of the United States Department of Agriculture, and while advertisements that do not accompany the package are not subject to the Food and Drugs Act, they have a plan for dealing with these products that will be of benefit to the committee and they have promised all the assistance in their power for the elimination of joke "cure-alls."

We would recommend that this committee be continued and that a campaign of education be undertaken. Armed with analyses from recognized authorities these miraculous cures whose wonderful virtues are a mystery, will prove so simple that the editors and publishers of agricultural papers who pose as moral leaders of rural life will be compelled to eliminate these jokes from their columns. We believe that the veterinary profession is at least on a par with the human medical profession so far as questionable advertisements of proprietary remedies is concerned. Let us be the leaders in this good work.

Dr. Mohler: Gentlemen, you have heard the report of Dr. Mayo. What is your pleasure?

Dr. Lyman: I move it be adopted and that the Committee be continued. (Motion seconded and carried.)

Dr. Mohler: The next in order is the report of the Special Committee on Investigation of Glanders, by Dr. E. B. Ackerman, chairman.

REPORT OF THE SPECIAL COMMITTEE FOR THE DETECTION OF GLANDERS

E. B. Ackerman, Chairman
Adolph Eichhorn C. D. McGilvray
Charles Cotton Charles Keane
John Reichel, Secretary

At the forty-ninth annual meeting of the American Veterinary Medical Association, by a motion duly seconded and passed, it was voted to recommend to the Association that the incoming President appoint a committee to investigate modern diagnostic methods for the detection of glanders and reach an understanding as to the best method for the control of glanders.

At a meeting of three of the members of the committee, February 15, 1913, it was decided to adopt the following outline, of the manner in which the study of the disease glanders may be fully covered.

1. Cause, variation in virulence.
2. Animals susceptible.
3. Period of incubation.
4. Modes of infection.
5. Manifestations; symptoms; prognosis.
6. Diagnosis:
    - Mallein—subcutaneous; ophthalmic; cutaneous.
    - Laboratory—cultural; animal inoculation.
    - Blood tests — opsonin; conglutination; precipitation; agglutination; complement-fixation.
7. Differential diagnosis, clinical and laboratory.
8. Pathological anatomy.
9. Quarantine—clinical, occult and exposed cases.
10. Disposition—clinical, occult and exposed cases.
11. Treatment.
12. Disinfection.
13. Re-testing and subsequent control.
14. State and Federal regulations.

The committee understood that its duties were to be confined to the study of the modern diagnostic methods and to reach an understanding as to the best method for the reduction of glanders.

Prior to and sometime after the discovery of the *Bacillus mallei* as the specific cause of glanders by Loeffler and Schutz, in 1882, the diagnosis rested entirely upon clinical observations. The symptoms of the disease are perhaps better differentiated at this time, but in the main the general picture of the clinical case is unchanged.

Since then more tests and methods of more or less diagnostic value have been proposed than in any other infectious disease of animals, which may be tabulated as follows:

1. Clinical Diagnosis.
2. Mallein Tests.
    - (*a*) Subcutaneous.
    - (*b*) Ophthalmic.
    - (*c*) Cutaneous (dermal, intradermal).
3. Laboratory Diagnostic Methods.
    - (*a*) Examination of Pus or Nasal Discharge.
        1. Microscopic.
        2. Cultural.
        3. Animal inoculation.

(*b*) Examination of Blood.
  1. Opsonin, conglutination, or precipitation test.
  2. Agglutination test.
  3. Complement-fixation test.

1. Clinical Diagnosis. Without going into details the cardinal manifestations may be enumerated as follows: Characteristic nasal discharge; nodule or ulceration; enlargement of submaxillary glands; cording of the lymphatics and fluctuation in temperature range.

2. Mallein Tests. Mallein, the toxic substance produced in cultures of the *Bacillus mallei*, was discovered by Hellman and Kallning in 1891. Pearson, working independently, prepared mallein and further proved that mallein, like tuberculin, produces a temperature rise in sensitized infected animals.

As the methods for preparing mallein vary greatly and the final products differ considerably, it is suggested that the name mallein, like tuberculin, abortin and kindred preparations, be given to the final product obtained in the following way: One or more highly virulent strains which are capable of producing an orchitis in a guinea-pig in twenty-four hours following intraperitoneal injection, or death in fourteen days following subcutaneous injection, are transferred to a medium containing 1.5 per cent. glycerin in peptone bouillon and incubated for no less than six weeks at 37° C.

The purity of the cultures and virulence of the strains should be determined before sterilizing the glycerin-peptone-bouillon cultures. After filtering out the killed bacilli note the exact volume of the filtrate, and concentrate the filtrate to one-tenth of its original volume over a water bath. The resulting product represents concentrated mallein or mallein.

The mallein solution for the subcutaneous test is mallein diluted with 0.5 per cent. carbolized salt solution.

Precipitated or purified mallein is a dry powder obtained from mallein which has been precipitated with many volumes of absolute alcohol. After filtering off the precipitate, it is re-dissolved in normal salt solution and washed repeatedly with absolute alcohol. The precipitate is finally dried over calcium chloride or sulphuric acid. A 5 per cent. solution is generally used.

The mallein prepared from one or more strains of *Bacillus mallei* should be tried out on sensitized animals before it is used for actual testing.

Even though the exact composition of the active principle of mallein remains unknown, the specificity of the reaction in sensitized animals has been established beyond question.

(*a*) *Subcutaneous Mallein Tests.* This is the oldest of the mallein tests, and is reliable when properly carried out and interpreted. It consists of injecting a mallein solution into sensitized animals where it produces a characteristic temperature rise and a local and general reaction.

The characteristic temperature rise begins in from four to eight hours and the maximum temperature is reached in from ten to twenty hours with a gradual return to normal.

At least two temperatures should be taken before the injection of mallein solution, three hours apart, and five temperatures after the injection beginning not later than the tenth hour and continuing to the twentieth hour at intervals of not less than two hours.

The smallest difference between the temperatures before and after injection should be 2.5° F., with a temperature rising to 103° or above.

Local Reaction. Several hours following the injection a hot, painful, œdematous swelling develops which may persist for several days, enlarging considerably and gradually disappearing.

Normal horses may show a local swelling which does not enlarge and rapidly disappears.

General Reaction. Lessened appetite, dulness, staring coat, muscle tremors, respiratory difficulties, altered pulse rate—one or all of which may or may not be present.

(*b*) *Ophthalmic Mallein Reaction.* This test has the advantage of being simple and easy to apply.

Application of Test. (a) Before applying the test, examine the eye for conjunctivitis or purulent discharge. Should a conjunctivitis exist the eye test should not be tried.

(b) Take temperatures before the ophthalmic test. Fever need not hinder the test.

(c) Place 4 to 5 drops (0.1 to 0.2 c.c. for one test) of undiluted mallein or 5 per cent. solution of precipitated mallein within the lower eyelid with a dropper, glass rod or camel's hair brush. Nothing is put in the other eye because it serves as a control. The same brush or glass rod may be used from animal to animal.

(d) As soon as the mallein is applied a flow of tears nearly always appears with reddening of the conjunctiva and photophobia. These phenomena have no significance and disappear in several hours.

(e) The characteristic manifestations of a positive reaction begin after five to six hours and last thirty-six to forty-eight hours, sometimes longer. *A purulent secretion or discharge with reddening of the conjunctiva alone is significant of a positive reaction.* Swelling and gluing of the eyelids may be seen in severe reactions.

(f) The eye should be examined and compared in good light sixteen to eighteen hours after the application of the test. The conjunctiva and the eyeball should also be examined after noting the discharge. Generally the positive reaction is not accompanied by a rise in temperature or a general reaction. A temperature variation does not occur in negative tests or normal animals. In positive reactions the rise may be observed. The temperature should be taken twice—the first time just before the test is applied and the second when the readings are made sixteen to eighteen hours later.

(g) The results of the test to be recorded and interpreted as follows:

N	Negative.	Eye unchanged.
S	Suspicious.	Seromucous discharge.
P +	Positive.	Seromucous discharge with purulent flakes.
P ++	Positive.	Distinct purulent discharge.
P +++	Positive.	A purulent discharge with swelling of the lower eyelid.
P ++++	Positive.	Strong purulent discharge with gluing together of both lids.

(h) If twenty-four hours after the first application the result of the test is negative or doubtful it may be repeated at once on the same eye or the control eye. If the repetition is also negative or questionable the test can be repeated after the lapse of three weeks.

(i) The intensity of the ophthalmic reaction bears no relation to the stage or development of the disease.

(*c*) *Cutaneous Mallein Test.* In the cutaneous-dermo-intradermal mallein tests the concentrated mallein is applied with a knife or vaccinating needle, rubbed into a shaved area or injected into the skin. In the latter test a highly diluted mallein is used in preference to a concentrated mallein.

In positive cases a spreading, warm, painful, and œdematous swelling will be observed in twenty-four hours.

The reactions are positive when distinct visible swellings in contrast to the unaffected control areas develop. In severe reactions vesicular eruptions may appear.

Since the skin tests are complicated and require special instruments, skill and practice, they are not considered practical for general veterinary purposes.

3. Laboratory Diagnostic Methods. The demonstration of the causative organism in smears by the microscopic examination and isolation of the organism culturally or demonstration of the infection by injecting the suspected material into a male guinea-pig which results in a typical Strauss reaction is considered positive evidence of the disease. The absence of these findings or a negative animal inoculation test does not warrant a negative diagnosis.

Examination of Serum. 1. Opsonin conglutination, or precipitation tests: The first have proved laborious and impracticable and the latter unreliable.

2. Agglutination test: Depends upon the power of the undiluted immune serum to clump bacteria suspended in carbolized salt solution. The presence of agglutinins is determined quantitatively by using measured amounts of serum and test fluid.

The readings are to be made after incubating the tubes and their contents for half hour at 37° C. and centrifugalizing at 1600 revolutions for ten minutes and then allowing the tubes to stand at room temperature for two hours.

The same results may be obtained by incubating the tubes and contents at 37° C. for twenty-four hours and allowing them to stand at room temperature for twelve hours more.

The appearance of a veil-like membrane with turned-in edges or small clumps or grayish-white or brownish flakes on the bottom of the tube may be regarded as a positive agglutination.

A sharply circumscribed sediment in the center of the centrifuge tube having the shape of lentil seeds indicates an absence of agglutination.

An agglutination value of over 1 to 1000 is indicative of glanders; but since high agglutination titers are obtained only in the acute form of the disease it is advisable to combine this test with the complement-fixation test and not make the diagnosis on the basis of this test alone.

3. Complement-fixation test: This is the most complicated of the tests and must be considered purely a laboratory diagnostic method requiring careful technique. Like the agglutination test it is a quantitative reaction in which the affinity of the immune bodies in the serum of a glandered animal for glanders antigen is utilized for the reaction in which the following play a part: Complement = normal guinea-pig serum; sheep-rabbit amboceptor = sensitized rabbit serum with washed red blood corpuscles of sheep; glanders antigen = shake extract of killed glanders bacilli; sheep corpuscles and the clear serum of the suspected animal.

The results of the test are to be interpreted as follows:

Horses in which the serum produces a complete fixation of the complement in quantities of 0.1 c.c. and 0.2 c.c. should be considered glandered.

Horses in which the serum gives a complete fixation with a quantity of 0.2 c.c. and an incomplete fixation with 0.1 c.c. should likewise be considered glandered.

Horses in which the serum produces an incomplete fixation of the complement in quantities of 0.1 c.c. and 0.2 c.c. should also be considered glandered.

Horses in which the serum shows no fixation of complement in either tube should be considered free of glanders.

The value of any diagnostic method cannot be accurately estimated or judged unless autopsies are made of all the tested animals that die or are destroyed by a carefully trained veterinarian. Macroscopic examinations are not sufficient with the presence of atypical lesions.

Unless typical lesions are present, histological and bacteriological examinations must be resorted to.

In deciding upon a method which would be the most satisfactory for the diagnosis of glanders, the simplicity, reliability and trustworthiness of the method must be above reproach.

The results should manifest themselves as soon as possible, the reaction should be well-marked and distinct and easily applicable by the average practicing veterinarian.

A test with these requirements places a test in the hands of the practising veterinarian along with which the standing of the veterinarian in the community, and the confidence of the public in the veterinarian are brought into closer relationship in that it enables the veterinarian to personally decide on the results of the test.

The ophthalmic test not only meets all these requirements but is without doubt the most convenient diagnostic method at our command.

Its reliability compares favorably with any of the other available tests.

The reaction is usually very distinct, and doubtful or atypical reactions are rather infrequent.

The ophthalmic test does not interfere with subsequent serum or other mallein tests where such are deemed necessary.

The test may be repeated within twenty-four hours on the same or the control eye, and final retest may be made in not less than three weeks.

The ophthalmic test should be recognized by state and federal authorities, since its reliability can no longer be doubted.

In all atypical and doubtful reactions with the ophthalmic test the combined complement-fixation and agglutination or subcutaneous mallein tests should be utilized for confirmation. Such a procedure would minimize the failures and assure the best results in controlling the disease in a single stable or in an entire community.

Appearance of the Reaction of the Various Tests after Infection. Agglutinins make their appearance in from four to five days and continue to increase in the early stages of the disease and diminish as the disease becomes chronic.

Specific amboceptors of the complement-fixation test may be demonstrated in from seven to ten days in sufficient quantities to diagnose the disease and their presence may be demonstrated during the entire course of the disease.

The subcutaneous mallein test may as a rule be relied upon after fifteen days following infection.

An ophthalmic mallein test may be relied upon after twenty days following infection.

Affect of One Test on Others. All blood serum tests are influenced after four to six days following a subcutaneous injection of mallein or any other glanders antigen (including glanders vaccines) for a period varying from four to eight weeks following the injection of mallein and up to three months and even longer following injection of glanders antigens or vaccines. All blood samples therefore should be taken prior to or at the time of the mallein injections.

The subcutaneous mallein test or an injection of glanders antigen and vaccines may influence the ophthalmic mallein test. The ophthalmic mallein test should therefore be withheld for thirty days after the subcutaneous application of mallein.

Control. In the eradication of glanders all clinical cases should be immediately destroyed. All suspected and exposed animals should be tested and the positive reactors destroyed. The remaining contact horses should be held under restrictions and subjected to a further test after the expiration of at least fifteen days. All infected premises should be thoroughly cleansed and disinfected.

All interstate movement of horses, mules and asses should be so regulated as to include the proper testing for glanders by the State or Federal governments.

Compensation for clinical and occult cases should be provided for.

As this committee was obliged to confine its efforts to only a part of the outline of the proper consideration of the disease glanders in its entirety, we respectfully recommend for your consideration the advisability of the appointment of a permanent committee or commission to consider the subject as outlined in the beginning of the report submitted herewith.

Dr. Mohler: Gentlemen, the report of the Committee on Investigation of Glanders is now before you for your consideration. What action do you wish to take in the matter?

Dr. Lyman: I move that it be received and be referred to the Committee on Publications. (Motion seconded and carried.)

Dr. Mohler: The next order of business is the election of officers. The first officer to be elected is your President. Nominations for the office of President are now in order.

Dr. Smith: Mr. President, I announced myself as a progressive in the early part of the evening; so I might just as well be consistent. I have a name that I wish to present to you for the high office of President of this Association. I do not intend to make any elaborate speech, extolling his virtues. All I have to say is this, that I fully realize the necessity of our having a great big broad-gauged man at the head of our Association. I understand that we are about to reorganize; and if we are going to reorganize, or attempt to do anything along those particular lines, to my mind it is very necessary that we should have a man in the chair who has some knowledge of the workings of the Association, who knows something of its history, who is an organizer himself, and who is an executive, a man who can inspire confidence, a man who will get everybody to work, irrespective of what has been said here this evening, work for the upbuilding of this Association, so that we can progress even greater and faster and grander in the next fifty years than we have in the past.

This man whom I am going to nominate is big and broad and safe and sane, and seldom misses fire. Now, the name I am about to present to you is Clarence J. Marshall, of Philadelphia.

Dr. Mohler: It is hardly worth while to ask if that nomination is seconded.

A Voice: I second the nomination.

Dr. Hoskins: Mr. Chairman, I would like to place in nomination a member of this Association who for more than twenty-five years has filled with the utmost fidelity the place of a member; a man who is well known to all the members of this Association for his contributions to veterinary science, for his contributions to this Association, for the performance of oftentimes arduous labor in this Association, for the uplift of veterinary education in our agricultural colleges and the stimulus that follows in the schools; a man who has been in attendance, I think, for almost twenty-five consecutive years and who has filled a conspicuous place in his state in the uplift of veterinary education, in the placing upon the statute books of Minnesota some of the best laws regarding the practice of veterinary medicine and some of the best laws regarding sanitary control work. He is a man that we can place in this position with the feeling of utmost security that he has a full knowledge of all the aims and purposes of this Association, and he has a knowledge of all its dealings with all the questions that come before us. I present for your consideration the name of Dr. M. H. Reynolds.

Dr. Lyman: Mr. President, I second the nomination.

Dr. Mohler: The nomination has been seconded. Are there any further nominations?

Dr. Cooley: Mr. Chairman, I make a motion that the nominations be closed. (Motion seconded and carried.)

Dr. Mohler: I will appoint three tellers to receive the votes and make the counting. Dr. DeVine, Dr. Kinsley and Dr. Milks. Dr. White will distribute the ballots.

Gentlemen, have you all been supplied with the blanks? If you have, I am going to appoint Dr. Stewart, Dr. Berns and Dr. Hoskins, as a Committee on Credentials, to see that the proper men are doing the voting. It will be sufficient if you exhibit your badges or membership cards. I know that some of you have left your badges down stairs in your rooms. If there is any question at all, you can be identified. I believe there are several men present who do not know whether they have been elected to membership or not; they can find out by requesting information from the Secretary.

Now, the tellers will stand here, and the ballots will be placed in their hats by the men coming up from the left and passing around to the right.

A Voice: Shall the ballots be left unfolded?

Dr. Mohler: That is a very good idea, that the ballots be left unfolded, only one ballot to be deposited at this time.

(Voting.)

Gentlemen, have you all cast your ballots for the office of President? If so, the tellers will retire and count the ballots in the Secretary's room.

Gentlemen, the next order will be the election of the five Vice-Presidents. I want to have you distinctly understand that the five names receiving the highest vote will be declared the five Vice-Presidents for the coming year, First Vice-President, Second Vice-President, Third, Fourth and Fifth, in the order of the total votes received.

Nominations for the office of Vice-President are now in order.

Dr. Turner: Mr. President, I desire to place in nomination for the office of Vice-President the name of Dr. James T. Glennon, of Newark, N. J. Dr. Glennon has been a member of this Association for fifteen or sixteen years, is a very conscientious and hard worker in the New Jersey Association, and has the respect of its members. (Nomination seconded.)

Dr. Maloney: I desire to place a name in nomination for Vice-President, and in electing him I think it will be a fitting recognition of what the old Bay State has done not only for general education but for the education in veterinary science. I believe that some of my older friends here from Massachusetts will agree with me that Massachusetts has been the nestor of veterinary science, in the form of the old veterinary school not known by the younger men, as she has been the cradle in which liberty has been rocked, as she has been the mother who has nourished education in this country. It seems to me at this time it would be very fitting to have Massachusetts represented on our executive board. I desire to place in nomination the name of Dr. L. H. Howard.

Dr. Ackerman: I rise to place in nomination the name of a man who has done much work for this Association, a man who is always ready to do his part, a man who has won international fame and who will carry the name of our Association to foreign shores next year at the International Veterinary Congress, a man whom we will be proud to have as one of the representatives of this Association. I take great pleasure in placing in nomination the name of Adolph Eichhorn.

(Nomination seconded.)

A Voice: I desire to place in nomination a man who is well known to the profession in Illinois, Dr. Dyson. (Nomination seconded.)

A Voice: I wish to place in nomination the name of Dr. H. Jensen, of Kansas City. (Nomination seconded.)

Dr. Fox: Mr. President, I am no speechmaker, and I do not intend at this time to make any speech in placing anyone in nomination for Vice-President of this Association. But you all know very well who accompanies me when I go to the Association meetings. I refer to Dr. R. A. Archibald. I would like very much to see him Vice-President of this Association. (Nomination seconded.)

Dr. Gill: Mr. Chairman, it gives me great pleasure to propose the name of Dr. W. Reid Blair, of this city. (Nomination seconded.)

A Voice: I would like to place in nomination the name of a man whom every member of this Association knows, a man who has done much for the Association, and as consistent work as any member who attends our Association meetings, Dr. John P. Turner, of Washington, D. C. (Nomination seconded.)

A Voice: Mr. President, we have in New Jersey a man who has been active in Association work for many long years, and who is well known to the members of this Association, and I feel confident that his name will receive favorable consideration at your hands. It is unnecessary for me to say anything more in his behalf, simply to mention his name, Dr. Thomas E. Smith, of New Jersey.

Dr. Smith: I most respectfully decline the nomination. I thank you very kindly.

A Voice: I would like to place in nomination the name of John W. Adams.

Dr. Adams: I respectfully decline the nomination.

A Voice: Mr. Chairman, I would like to nominate Dr. Robert P. Lyman. (Nomination seconded.)

Dr. Adams: Mr. Chairman, there seems to be no dearth of candidates, but one has occurred to me. I should like to nominate one of the younger members of our society, a man who takes a very active interest in the society, a representative of what is best in it, and an inhabitant of one of our southern states. I place in nomination the name of Dr. Jacob, of Knoxville, Tenn. (Nomination seconded.)

Dr. Hoskins: Mr. Chairman, I note that there has not been a single nomination from Canada. A very large number of men come from Canada, and I would place in nomination the name of Dr. Torrance.

Dr. Mohler: Are there any further nominations? The Chair will then entertain a motion to close the nominations.

A Voice: I move that the nominations be closed. (Motion seconded and carried.)

Dr. Mohler: The candidate receiving the highest number of votes will be the First Vice-President, and accordingly all the way down until five have been chosen.

I appoint Dr. Peters, Dr. Helmer and Dr. Knowles as tellers to collect and count the ballots, and will also ask this other committee composed of Dr. Hoskins, Dr. Stewart and Dr. Berns to serve as a Committee on Credentials.

(Voting.)

Gentlemen, are there any further ballots to be cast? Otherwise the ballot will be declared closed.

The next officer to be elected is your Secretary. Nominations for Secretary are now in order.

Dr. Stewart: I am pleased to place in nomination the name of Dr. L. A. Merillat.

A Voice: I would like to second that nomination.

Dr. Adams: Mr. Chairman, I would like to place in nomination for the office of Secretary a gentleman known and honored by us all, who has been a member of this Association for twenty odd years, a man who has been tried and found true in state and federal positions, a man who has always been an earnest worker in this Association, who has never taken any part in its politics, who has never desired anything for himself, who has worked steadily and faithfully for the best interests of this society, a man who has good executive ability, and a man who would reflect credit upon us in the office of Secretary. I take pleasure in nominating Dr. N. S. Mayo, of the Virginia Polytechnic Institute. (Nomination seconded.)

Dr. Gibson: Mr. President, I take pleasure in nominating a gentleman for the office of Secretary who needs no advertisement, no words of praise, one of the best-known men in our profession in America. I nominate Dr. L. A. Merillat, of Chicago.

Dr. Mohler: He has already been nominated, Dr. Gibson.

A Voice: I move that the nomination be closed. (Motion seconded and carried).

Dr. Mohler: The two men nominated are Dr. Merillat and Dr. Mayo.

I appoint as tellers, Dr. Traum, Dr. Kinsley and Dr. Stone.

The Committee on Credentials will please take their usual positions. (Voting.)

Gentlemen, have you all cast your ballots for Secretary? If you have, the tellers will proceed to make their official count.

The next officer to be elected is the Treasurer. Nominations for Treasurer are now in order.

A Voice: Mr. President, I take great pleasure in nominating a man who has served us so long and so well, Dr. George R. White, of Tennessee.

A Voice: I second the nomination.

A Voice: Mr. President, I move that the ballots be now closed. (Motion seconded and carried.)

A Voice: Mr. President, I move that the Secretary be authorized to cast the ballot of this Association for Dr. White. (Motion seconded and carried.) .

The Secretary: I now cast the ballot of the Association for the election of Treasurer, George R. White.

Dr. White: Mr. President and Gentlemen of the Association, it certainly gives me great pleasure to be elected Treasurer of your organization by unanimous consent. I think this is the ninth time you have honored me with this office. I shall endeavor to serve you for the next year as faithfully as I have done in the past and I will endeavor not to default with any of the funds during that time.

Dr. Mohler: The next office to be filled is that of Librarian. Nominations for the position of Librarian are now in order.

A Voice: Mr. President, I nominate J. N. Frost for the office of Librarian. (Nomination seconded.)

A Voice: I move that the nominations be closed. (Motion seconded and carried.)

A Voice: Mr. President, I would move you that our Secretary be authorized to cast the ballot of this Association for the election of Dr. Frost as Librarian. (Motion seconded and carried.)

The Secretary: Mr. President and Gentlemen, by direction of the President I now cast the ballot of the Association for the election of Dr. Frost as Librarian of this Association.

Dr. Mohler: The Chair declares Dr. Frost elected to the position of Librarian.

Are the tellers ready to annouuce the vote for the election of President?

Dr. DeVine: Mr. President and gentlemen: Total number of votes cast for the office of President 222; Dr. C. J. Marshall receiving 165, Dr. M. H. Reynolds 57.

Dr. Mohler: In accordance with your vote, I declare Dr. Marshall elected President of the Association for the coming year. (Cries of "Speech.")

Dr. Marshall: Mr. President and Gentlemen: It is impossible for me to tell you how glad I am to be elected Prseident of this great Association.

We are told that it is more blessed to give than to receive, and I can assure you that I am supremely blessed tonight, and it pleases me to know that there is so large a number in this audience that are still better pleased than I am. I hope that I may do the work well, and if any grievances have been caused on account of this election I hope they will all be forgotten and that everybody will work for the building up of the Association and make it what it should be in the future.

Dr. Baker: I move that the election of Dr. Marshall be made unanimous. (Motion seconded and carried.)

Dr. Mohler: I wish to congratulate you Dr. Marshall and to inform you that you have been elected unanimously.

Is there any further business that you wish to bring before the convention while we are waiting for the tellers to report on the Vice-Presidents?

Dr. Stewart: Mr. President, I desire to speak of the purpose of this New Orleans emblem which has been so much in evidence here. I am delighted to know that we have such a hearty invitation, not only by the Mayor of New Orleans, but by the veterinarians of Louisiana and the whole South. Not only is the invitation hearty, but it comes with the statement that they need us, that we can do them great good, and certainly that is the right kind of a feeling to evince. One of the great purposes of this Association is that it may do the locality good. I am mighty glad that this invitation is before us.

However, I would say that the Missouri Valley Veterinary Association also extends to you an invitation to come to its territory, and specifies particularly Kansas City as a place in which to hold your meeting. The Missouri State Association also extends the same kind of an invitation. So in the event that you find it is impracticable to go to New Orleans, bear in mind that you still have another invitation equally cordial. You have an invitation to the territory where the coming of this Association will do great good. I assure you of the hospitality of the Missouri Valley. So that we have now two places to which we may go.

Dr. Ranck: Mr. President, as Dr. Stewart has already mentioned, the South certainly needs this Association. If there is any one section of the United States that needs the assistance of this entire body it is the South. We have a pest that has come into our midst during the last few years that has almost put one of our principal businesses out of commission, and that is the raising of cotton. It is the cotton boll weevil. In certain sections where we had been raising from twenty-eight to thirty thousand bales of cotton a year, today we are raising less than a thousand.

We are raising live-stock; we need veterinarians; we need animal husbandmen, and, as Dr. Dalrymple well said the other night, only once in fifty years has this Association seen fit to go below the Mason and

Dixon line. I think that was in 1897 when it met at Nashville, sixteen years ago.

Now, the question arises in a great many minds whether or not it is practicable and feasible to go there, even at this time of the year. I can assure you, gentlemen, that it is. I am a Pennsylvanian by birth and was raised there and educated there, and some fifteen years ago I cast my lot in the South, and I may say that in ten years of active practice there we have had less cases of heat prostrations than we had in Pennsylvania. We have very cool summers, so that it would be feasible even if we met there at this time of the year.

But as we understand there is going to be an international veterinary congress abroad next year, about this time, it occurred to the Southern men that it might be advisable, if it met with the wishes of this Association, to have the incoming Executive Committee change the date, if possible, in this one instance.

I therefore offer this motion, that the by-laws of the Association be suspended in order to authorize the incoming Executive Committee, providing it decides to favor New Orleans for the next meeting, to change the date of meeting in 1914, from the usual time to the holiday week, in December of that year. I hope that I can get a second to that motion. That merely allows the Executive Committee to use its discretion, in case it sees fit to change the date of the meeting to that time.

A Voice: Mr. President, I take pleasure in seconding that motion.

Dr. Mohler: It is moved and seconded that the by-laws be suspended and that the incoming Executive Committee be authorized, provided it decides to favor New Orleans as the place for the next meeting, to change the date from the usual time to the holiday week of that year, 1914. Are you ready for the question? (Cries of "Question.") All in favor, please say aye; opposed, no. It is carried.

Are the tellers ready to report?

Dr. Kinsley: Mr. President, total number of votes cast for Secretary 191, of which Nelson S. Mayo received 115 and L. A. Merillat 76. Necessary to elect, 96.

Dr. Mohler: The Chair declares Dr. Mayo elected Secretary of the Association. (Cries of "Speech.")

Dr. Mayo: Mr. President and Gentlemen of the Association: Words fail to express my appreciation to you of this high honor, especially when I was a candidate against such a splendid opponent; it is especially gratifying to me.

I wish to say to you that while I am not a progressive I hope to give everybody a square deal; there are no strings tied to me whatever in any way. I will try to serve the Association to the best of my ability. I thank you.

Dr. Mohler: If there is no further business the Chair will declare a recess of ten minutes until we hear from the tellers who are counting the votes for Vice-Presidents.

(Recess of ten minutes.)

Dr. Mohler: Gentlemen, please come to order. You will now listen to the report of the tellers.

Dr. Peters: The Committee has to report the following votes for Vice-Presidents: Dr. Eichhorn, 138; Dr. Torrance, 138; Dr. Blair, 102; Dr. Archibald, 101; Dr. Jacob, 95.

Dr. Mohler: Gentlemen, Dr. Eichhorn has 138 votes and Dr. Torrance has 138. How will you break the tie?

Dr. Eichhorn: Mr. Chairman and gentlemen: I move that Dr. Torrance be made your First-Vice-President.

(Motion seconded and carried.)

Dr. Mohler: Dr. Torrance is First Vice-President; Dr. Eichhorn is Second Vice-President; Dr. Blair is Third Vice-President; Dr. Archibald is Fourth Vice-President, and Dr. Jacob, Fifth Vice-President.

If there is no further business the Chair will entertain a motion to adjourn.

A Voice: I move we adjourn. (Motion seconded and carried.)

GENERAL SESSION

Thursday Morning, September 4, 1913

The President: The only business on the program this morning for the General Session is the postponed address by Senator W. C. Edwards. Thus far he has not made his appearance, nor have I any explanation to offer. We have with us, however, Mr. Towle, of the Bureau of University Travel, and the privilege of the floor will be extended to him in order to make an announcement with reference to the International Veterinary Congress which meets in London next August, and the European travel trip which he proposes to conduct in conjunction therewith, and with the coöperation of Vice-President Eichhorn.

Mr. Towle: I do not know as there is anything that I can say beyond what you already know concerning the plans which Dr. Eichhorn has made for the meeting of the International Congress of Veterinarians at London next August. It seems that he is not planning to go directly to London, but intends to visit the interesting things on the route. Dr. Eichhorn has laid out a route, the territory of which he covered last year with a private party, and which included quite a number of American gentlemen who are interested in agriculture. That private party which went over last summer was given a fine reception by certain official bodies over there which gave them a great insight into the agricultural methods in Europe. It seems to me that a delegation from the A. V. M. A. will certainly receive a great deal of attention from officials and official bodies over there, and also from the veterinary schools, agricultural schools, and bodies in

Europe on such a trip as this that will make the trip of tremendous value and interest. The ladies, of course, are also invited. We are going to have some special programs made out for the ladies, which will make the trip of special interest to them. While the gentlemen are doing the veterinary stunts, the ladies will be carefully attended to.

Since the doctor put the business management of this in my hands, I have been hoping that we will have at least one hundred and if we have that number we will be able to get a special train through Europe. That is the minimum for which we can get a special, and if we can get that number we can get lower rates, and it will enable us to go first-class throughout; otherwise, we shall have to go second-class. That does not mean that we will have a cheap, inferior service. The second-class trains over there are about the same as our regular trains in this country; but if we can get one hundred we can travel first-class. I am glad to be able to tell you that since yesterday at nine o'clock I have talked with about one-half of that number, and from among those that I have talked with, counting their wives, there are at least fifty who have promised to go if nothing happens. If we can secure fifty in the last twenty-four hours, I do not believe we are going to have any difficulty about getting our special train.

We are going to visit agricultural colleges and farms, as well as the great capitals of the various countries from Edinburgh on the north and from Paris on the west to Budapest on the east and Milan on the south. We are going to see the beautiful waterfalls in the countries of the north, the Jungfrau in Switzerland, and go down the blue waters of the Danube. We are going to take in as many points of interest on the trip as the time will permit. We are going to reach London on August 3, just in time for the International Congress of Veterinarians next summer.

Now, I wish if there are any who are thinking of going, that they would give their names to Dr. Mohler or to me. We would like you to make up your minds to join this party, because if you do so now, before leaving New York, we can go to the steamship companies with definite statements as to about the number of berths that we will require. June 13, the day named for sailing, is a very popular date, and it is not easy to get accommodations to Europe unless they are engaged sometime ahead, so we must speak soon. We would like very much to be authorized to go down to the steamship companies and dicker with them for one hundred berths on a boat scheduled to leave New York harbor in June next.

I think there is nothing further that I can say that will give you any additional information about our plans. I thank you.

THE PRESIDENT: The Secretary has an announcement to make.

SECRETARY MARSHALL: The announcement I have to make this morning is in reference to your tickets. We want to get the advantage of reduced fares returning, if possible; but in order to do that, the agent of the railroad must see at least one hundred tickets. No matter whether you have got return-trip tickets or not, he is going to see your tickets so that if some of you gentlemen want to take advantage of the reduced rates, if you will just step up to the gentleman who will be out there in the adjoining room, and show him your ticket, we can get that matter fixed.

THE PRESIDENT: Immediately after the General Session adjourns there will be a section meeting here of the Section on Sanitary Science and Police.

There is no official business before the General Session at this time, and so I will entertain a motion to adjourn.

DR. WHITE: The southern members are requested to meet at once in the Executive Committee room around the hall.

If there is no further business, Mr. Chairman, I move we adjourn.

Motion seconded and passed.

GENERAL SESSION

FRIDAY MORNING, September 5, 1913

DR. MOHLER: Gentlemen, please come to order.

The opening address this morning will be delivered by a gentleman who requires no introduction to our members. We are always pleased to hear from him on any subject, but especially on the milk problem, to the solution of which he has given such earnest thought and indefatigable labor. I take great pleasure therefore in presenting to you Dr. William A. Evans, of the Northwestern University of Chicago.

IMPROVEMENT OF THE MILK SUPPLY

BY PROFESSOR WILLIAM A. EVANS, M.D.
Northwestern University, Chicago, Ill.

Mr. Chairman, Ladies and Gentlemen:

About two years ago the New York Milk Committee, recognizing the chaos that prevailed in the milk business, and recognizing that one of the reasons for this chaos was a lack of standards, decided that they would appoint a Milk Standards Commission, this commission to be composed of men who had had experience with milk in different ways, in order that each might bring to the work of the commission his point of view, and with the idea that that presentation would be of service in arriving at conclusions. The idea was that, this report having been made, ordinances and laws would be adopted, drawn along the general lines of the report, and that if then it should be found that there were features of the report that did not work well, modification would ensue. It was not thought that one general statute, or one general ordinance, could be drawn applicable to all parts of the country, since that which has made the milk question difficult to handle has been the fact that it does not enter into general commerce, the reason being that there is so much of variation between the different communities and so many things that make it impossible for the supply of one community to be available to any large extent for any other community. In other words, one of the factors that has worked against getting milk on the same commercial basis that other commodities are on is the fact that milk problems are flavored or tinctured by local conditions. Nevertheless, it was thought that gain would be had if there could be a certain thread of uniformity, on which variation would be made to suit the peculiarities of different communities. This was as much as the New York Milk Committee had in mind in the selection of this Milk Standards Commission.

Some two hundred names were submitted for membership on the commission and out of that number approximately twenty were selected, most of whom have remained with the commission during its two years of existence. The membership commission, as at present constituted, is composed of Dr. B. L. Arms, who at that time was an assistant in the department of biology and public health of the Massachusetts Institute of Tecnology, and director of the laboratories of the Health Department of Boston, now director of the laboratories of the Health Department of the State of Oregon; Dr. John F. Anderson, director of the Hygienic Laboratory of the United States Public Health Service, Washington, D. C.; Prof. H. W. Conn, director of the Bacteriological Laboratory of the Connecticut State Board of Health; Dr. E. C. Levy, Health Officer of Richmond, Va.; Dr. A. D. Melvin, Chief of the Bureau of Animal Industry of the Department of Agriculture; Dr. Wm. H. Park, Director of Laboratories, Department of Health of the City of New York; Mr. Raymond A. Pearson, President of the State College of Agriculture of Ames, Iowa; Dr. M. P. Ravenel, Director of the Hygienic Laboratory of the University of Wisconsin; Prof. M. J. Rosenau, Professor of Hygiene and Preventive Medicine, Harvard Medical School; Mr. Chester H. Wells, Health Officer, Montclair, N. J.; Prof. Henry C. Sherman, of the Department of Chemistry, Columbia University, New York City; Dr. L. L. Van Slyke, of the Department of Chemistry of the New York Agricultural Experiment Station; Dr. Charles E. North, Consulting Sanitarian, a member of the New York Milk Committee, and Secretary of the Commission; Dr. J. N. Hurty, Secretary of the State Board of Health, Indianapolis, Ind.; Dr. Joseph S. Neff, Director of the Public Health Department of Philadelphia, Pa.; Dr. John S. Fulton, Director of the State Department of Health, Baltimore, Md.; and myself.

As you will notice, the veterinarian interests are represented by Dr. Melvin, and I think fairly also by Dr. Ravenel; the health departments, by several secretaries of state boards of health, by health officers of large communities—for instance, Chicago, New York and Philadelphia; of middle-sized communities, such as Richmond, Va.; and of small communities by Mr. Wells of the Department of Health, of Montclair, N. J. The U. S. Public Health Service is represented by Dr. Anderson. Various agricultural colleges are represented by President Pearson, of the Iowa College, and by Prof. Stocking, of Cornell, and Prof. Van Slyke. After two years of deliberation the committee issued a report with the understanding that that report would be distributed by the Public Health Service. It was so distributed in May, 1912. After many thousands of copies had been distributed, and after requests for opinions had been replied to from many different sources, the commission was again called together with the view of amending the report in the light of the year's experience.

The meeting for the consideration of the report for its revision, with a view to final publication, was held at Richmond in April. The report was issued on August 22, 1913, and is to be found in the Public Health Reports for that date. I had hoped to have a considerable supply of those reports here this morning. The New York Milk Committee have just telephoned that they have not had the supply from Washington that they expected, but that a moderate number, in fact a small number, of copies would be in the room before we adjourn this morning. They suggested that those anxious to secure copies write to the United States Public Health Service, Washington, D. C., for a copy of their report, dated August 22, 1913. Should you prefer, however, if you will furnish me a list of the members, I will endeavor to have a copy of the report sent to each member. I will transmit that list to Dr. Anderson, of the Public Health Service, who has the matter in charge.

Now, I am going to read a few of the subjects covered in this report, those that are of particular interest to the gentlemen who constitute this organization; and then I am going to speak to three of those subjects, not to the report in its entirety, but to three of the points that are covered in the report.

The sections that I have marked to be read are the following: The preamble begins with these words: "Proper milk standards, while they are essential to efficient milk control by public health authorities and have as their object the protection of the milk consumer, are also necessary for the ultimate well-being of the milk industry itself. Public confidence is an asset of the highest value in the milk business. The milk producer is interested in proper standards of milk since these contribute to the control of bovine tuberculosis and other cattle diseases and distinguish between the good producer and the bad producer."

I will now read some more along the same line. The reason for introducing this is that I am presently going to say something about the failure of the milk business to develop as it should, which in some measure is the result of a lack of public confidence in milk. On this general subject of the lack of uniform conditions in the different communities they say:

"These are the results of a study of the printed rules and regulations of the cities of the United States and of foreign countries and represent an immense amount of work on the part of the special commission to which the task was assigned. Some communities are in a position to adopt all of these rules and regulations at the present time, while other communities will be obliged to adopt a few rules at a time as public sentiment and local conditions warrant. It is realized that some of the rules will have to be modified to meet local conditions."

One of the criticisms that the report has been subjected to is the fact that the rules better fit the conditions in large cities than they do those in small cities. That would mean this, that it is possible for a small city to have a better milk supply than a large one. As a general proposition I think it is true that small communities have worse milk supplies than large communities. That is by reason of the fact that they make no effort to control their milk supplies. When they do make such efforts, it is found that it is relatively easy to control them in small communities as compared with large communities. Therefore certain bacterial standards to which I shall presently refer, while they are the bacterial standards that we have to compromise on when we are dealing with the large community, should not obtain in the small community; the small community can do infinitely better.

You will understand that the milk as it comes from a cow is comparatively free from bacteria; it is usually of low bacterial count. Occasionally there is found a cow giving milk containing many thousand bacteria as it issues from the udder. As a general proposition, however, the bacterial content of newly drawn milk is low. There are certain ferments that develop in milk shortly after it is drawn, the nature of which we know very little about, which are, however, bactericidal. They are something more than restraining in their action on bacteria; they seem to be bactericidal, so that at the end of about six hours there are fewer bacteria in the milk than there were at the time it was drawn—that is, in milk that has been well kept. This ferment action is a self-limited action, so that after about six hours it ceases to operate and bacterial multiplication begins in earnest.

The communities, therefore, that have their cows close up to their babies, that have the mouth of the baby in close juxtaposition to the cow, have no great difficulty in securing milk of a low bacterial count. Whenever you begin to interpose between the baby and the teat any sort of foreign circumstance or happening, you increase the number of bacteria that you must have in milk, from which there seems to be no practical escape. If the milk is produced on the premises where it is consumed, and if any sort of effort is made to secure healthy cows, the milk under those circumstances is very much cleaner, very much better and very much more wholesome than milk that is produced under any other circumstance. If the milk is produced a few miles away in the country, so that it needs to be hauled but a short distance, handled by few people—the people who produce and the people who consume, let us say—but one wagon intervening between the cow and the baby, a double delivery, let us say, so that much of the milk is consumed before it is six hours old and all of it is consumed before it is twelve or fourteen hours old, under those circumstances you can demand and can secure very much lower bacterial counts than are set by this commission. You will understand that a bacterial standard is not an absolute thing; it is merely a measure by which the sources of the milk are to be judged; and if a milk that is but a few hours old and that has been handled by but few people has a high bacterial count, it means that the conditions under which it was produced and under which it has been kept have been almost unspeakably bad. If, however, the milk is a day or more old, has been hauled fifty or more miles, has been hauled in a railroad train and by two or more wagons, it may have a hundred thousand bacteria without it indicating that there has been gross negligence at any point along the line. Therefore these bacterial standards are to be taken in this light: a community that cannot secure better than two hundred thousand as its standard of bacterial count, will be fair or moderately fair to the children who consume cow's milk, if they allow that to be the standard of their community. If, however, a community has cows kept on the premises, or cows within four or five miles of town, and a double daily delivery of milk, it would not be at all fair to those babies if the health department were to allow a count of two hundred thousand.

Classification of Milks

There is no escape from the conclusion that milk must be graded and sold on grade, just as wheat, corn, cotton, beef and other products are graded. The milk merchant must judge of the food value and also of the sanitary character of the commodity in which he deals. The high-grade product must get a better price than at present. The low-grade product must bring less.

I do not know how it came about, but there is considerable public opinion that milk should be classed as milk, and that no adjectives should be applied to milk. This is difficult for me to understand, because in the whole range of commerce there is not another thing within my knowledge that is bought and sold that is not graded and classified. It is true of cotton, where we have all sorts of titles and adjectives applied to it; it is true of wheat;

it is true of meat; it is true of lard; it is true of calico; it is true of silk; it is true of iron, of steel, of cars, and of elephants. Everything that is bought and sold is graded and classified except milk, and why anyone could assume that this particular commodity could thrive on a commercial basis, violating that which is a proven and fundamental rule of commerce, I have never been able to understand. It seems to me that one of the necessities, if the milk business is to thrive, is that milk should be made to conform, just as far as it is posible for it to conform, to the ordinary commercial lines, and where it does not automatically conform to such commercial lines there should be such regulation and control as would cause it to travel in those grooves where it has been demonstrated that business best prospers.

BACTERIA

The subject of bacteria in milk received more attention than any other matter brought before the commission. The commission recognizes that bacteria in milk in the majority of instances indicate dirt or lack of refrigeration or age, while in the minority of instances the bacteria of disease may be present. The routine laboratory methods of examining milk have as their purpose only the control over dirt, refrigeration, and age, and it is a rare thing for a laboratory to undertake the examination of milk for the bacteria of disease because of the extreme difficulties in detecting them. The more efficacious method of protecting milk from infection by the bacteria of human contagion is by medical, veterinary, and sanitary inspection, and by pasteurization. Milk with a high bacteria count is not necessarily harmful, but when used as a food, particularly for children, is a hazard too great to be warranted. Milk with a high bacteria count, therefore, should be condemned. Milks with small numbers of bacteria are presumed to be wholesome, unless there is reasonable ground for suspecting that they have been exposed to contagion.

I now come to the subject of "Laboratory Examination for Bacteria."

I am going to digress far enough to say that we are not infrequently disturbed by the perfection of certain laboratories; for instance, Dr. Mohler's laboratory. We get an idea that the laboratory is not a laboratory unless it has the equipment in men and in instruments that these better-developed laboratories have.

We are estopped by this conception of a laboratory from undertaking laboratory work in our smaller communities, those communities that cannot afford the more complete equipment that is to be found in such laboratories. Let me suggest that there is no community that is large enough to afford a public school that is not large enough to afford a laboratory for the examination of milk, at least insofar as sanitary considerations are concerned. The equipment required is simple, and for certain procedures the technical training required is hardly worthy of consideration. As you gentlemen very well know, the simple Babcock instrument has now carried the testing of butter fat in milk to the farm, so that it is done by the farmer's son and not infrequently by the thoroughly untrained farmer himself. There is a fair method of testing the sanitary quality of milk that is even simpler than the application of the Babcock test, and that is the dirt test—the filtering of a given quantity of milk through a filter for the purpose of disclosing the amount of dirt that is in that sample. For instance, the milk having been thoroughly agitated, a pint is removed therefrom, and that pint is filtered, and the amount of dirt caught on the filter is held for purposes of demonstration and education. Milk can be filtered through a pledget of cotton; it can be filtered cold—however, it filters better warm; it can be filtered with no apparatus at all except a funnel and a pledget of cotton. That is rather slow and we will be better satisfied all around if we have a little bit more apparatus than that. In the city of Chicago we have been using an ordinary plain, simple filter with a pledget of cotton in the bottom of the filter; that filter runs into a vacuum bottle, and in that vacuum bottle a small degree of vacuum or low air-pressure is maintained. You can get enough vacuum by merely attaching this vacuum bottle to a current of running water; so that any place that has running water has about all of the equipment that is needed for the making of the dirt test. For a while we had our men equipped with a large rubber bulb that would hold about a pint, and they would create a slight degree of vacuum in that bottle by simply exhausting the air with the bulb. I am going into these little details, because they show that not much apparatus is required for the dirt test. Certainly it would be easy indeed to equip the laboratory of your public school with the Babcock test; and you could not do a better thing for the milk supply of your community and for the people of the community, and for the children themselves than to have them periodically and systematically examine the milk supplies of your community with the Babcock test. Some of you here I am sure have had experience as school teachers. You will understand the advantage from the pedagogic standpoint of using for the purposes of study something in which there is a human or personal interest. Therefore your children in school will learn very much more about the question of fat and certain chemical questions, if they use things that they bring from their homes, than if they use things that appeal to them altogether from a didactic standpoint. The same thing is true of the dirt test. There is no reason why the students of the public schools should not regularly and systematically apply the dirt test to the milk supply of their community.

Now, a bacterial count—that is to say, a quantitative count—is a matter of somewhat greater difficulty. It requires a little more experience, but very little more of equipment. If the counts are to be made at incubator temperatures, an incubator can be constructed at very small cost. You are to remember that the microscope required for a quantitative bacterial count is a very low-power microscope, and therefore the expensive microscope equipment that you ordinarily have in mind when you think of bacterial work is not required for the quantitative counts of milk or water or other substances in a community. Without going into further detail, it would be easily possible for the senior grades in your local schools to carry out bacterial examinations of the milk supplies of those communities. I mean now quantitative examinations, and that is about all that we put very much stress upon. As a practical administrative matter we do not get very much from qualitative examinations of milk.

There are a few bacteria pathogenic for the human being that have been demonstrated in milk. The best known of these is the tubercle bacillus. You heard Dr. Park tell his story last night, how they found that about 12 per cent. of the milk supply in New York City contained tubercule bacilli. Quite uniformly those tubercle bacilli are virulent for guinea-pigs. You heard his further statement that the proof, such as is obtainable on such a question as this, is that a large percentage of those tubercle bacilli are virulent for the human animal; a large percentage of them are bovine tubercle bacilli, virulent for children in the mid-period of child life; many of them are human tubercle bacilli, virulent for younger children, for babies, and those in the first two years of life, producing pulmonary tuberculosis in those cases, and a small percentage are virulent for adults. There is some evidence, and I think quite conclusive evidence, that typhoid bacilli have been found in milk. Of course we have presumptive evidence, that is quite conclusive and has been so accepted by the courts, found in the development of typhoid fever amongst people who have been consuming a certain milk, in the handling of which milk at some point or other there has been probably infection with typhoid. Of course that evidence is quite conclusive to fairminded people. It is generally accepted as conclusive when offered in courts of law. At the same time, it is nothing more than presumptive proof. They have, however, demonstrated that the typhoid bacillus has been found in milk, making use of the Widal reaction. Then there is septic sore-throat, in which I think the proof is quite definite that certain of the streptococci are responsible for the spread of the disease; but just the relation between those streptococci and the streptococci derived from the udder of the cow has not been established.

Now, that is about as much as we know about the pathogenic bacteria in milk. It is not of very much practical or administrative value, as I said a while ago, as a general proposition. After you have had the lapse of the period of incubation, the development of the disease, the number of days required for purposes of the inquiry, the condition responsible for the infection of the milk has terminated so that is not of any practical value from that standpoint at all. But the use of the bacterial standard as a method of measuring the standards, the sanitary standards, the hygienic standards, the probabilities of proper care in the production of milk on the part of those who are responsible for its production and for its handling—the advisability of using the bacterial count for these measuring and estimating purposes, I think has been fully established.

I have something here on the subject of "Laboratory Examinations for Bacteria." It is proposed to grade milk into the following three grades:

Grade A. *Raw Milk.* "Milk of this class shall come from cows free from disease as determined by tuberculin tests and physical examinations by a qualified veterinarian, and shall be produced and handled by employees free from disease as determined by medical inspection by a qualified physician, under sanitary conditions such that the bacteria count shall not exceed 100,000 per cubic centimeter at the time of delivery to the consumer. It is recommended that dairies from which this supply is obtained shall score at least 80 on the United States Bureau of Animal Industry score-card.

Pasteurized Milk. Milk of this class shall come from cows free from disease as determined by physical examinations by a qualified veterinarian and shall be produced and handled under sanitary conditions such that the bacteria count at no time exceeds 200,000 per cubic centimeter. All milk of this class shall be pasteurized under official supervision, and the bacteria count shall not exceed 10,000 per cubic centimeter at the time of delivery to the customer. It is recommended that dairies from which this supply is obtained shall score 65 on the United States Bureau of Animal Industry score-card."

I may say that one of the most extensive discussions that we had was as to the score required on the Animal Industry score-card. There were men who believed that those scores were too low. The question was finally settled, however, when we remembered the difference in the personal equation of the scorer. The 90 of one man is about the same as the 45 of another man, and if we put a score that was too high the result would be that some fellow would merely lower his standards of scoring and in that way bring up his average score.

GRADE B. "Milk of this class shall come from cows free from disease as determined by physical examinations, of which one each year shall be by a qualified veterinarian, and shall be produced and handled under sanitary conditions such that the bacteria count at no time exceeds 1,000,000 per cubic centimeter. All milk of this class shall be pasteurized under official supervision, and the bacteria count shall not exceed 50,000 per cubic centimeter when delivered to the consumer.

It is recommended that dairies producing grade B milk should be scored and that the health departments or the controlling departments, whatever they may be, strive to bring these scores up as rapidly as possible."

GRADE C. "Milk of this class shall come from cows free from disease as determined by physical examinations and shall include all milk that is produced under conditions such that the bacteria count is in excess of 1,000,000 per cubic centimeter.

All milk of this class shall be pasteurized, or heated to a higher temperature, and shall contain less than 50,000 bacteria per cubic centimeter when delivered to the consumer. It is recommended that this milk be used for cooking or manufacturing purposes only.

Whenever any large city or community finds it necessary, on account of the length of haul or other peculiar conditions, to allow the sale of grade C milk, its sale shall be surrounded by safeguards such as to insure the restriction of its use to cooking and manufacturing purposes."

Now gentlemen, I think I will read to you one other section under the title, "Cows."

Requirements. "1. A physical examination of all cows shall be made at least once every six months by a veterinarian approved by the health authorities.

2. Every diseased cow shall be removed from the herd at once and no milk from such cows shall be offered for sale.

3. The tuberculin test shall be applied at last once a year by a veterinarian approved by the health authorities.

4. All cows which react shall be removed from the herd at once, and no milk from such cows shall be sold as raw milk.

5. No new cows shall be added to a herd until they have passed a physical examination and the tuberculin test.

6. Cows, especially the udders, shall be clean at the time of milking.

7. No milk that is obtained from a cow within fifteen days before or five days after parturition, nor any milk that has an unnatural odor or appearance, shall be sold.

8. No unwholesome food shall be used."

Milk from cows reacting to the tuberculin test can be pasteurized and sold under proper supervision.

In addition to those requirements, certain recommendations are made.

Recommendations. "1. Every producer shall allow a veterinarian employed by the health authorities to examine his herd at any time under the penalty of having his supply excluded.

2. Certificates showing the results of all examinations shall be filed with the health authorities within ten days after such examinations.

3. The tuberculin tests shall be applied at least once every six months by a veterinarian approved by the health authorities, unless on the last previous test no tuberculosis was present in the herd or in the herds from which new cows were obtained, in which event the test may be postponed an additional six months.

4. Charts showing the results of all tuberculin tests shall be filed with the health authorities within ten days of the date of such test.

5. The udders shall be washed and wiped before milking."

Now, gentlemen, I think I will close, because I notice that we have come to the hour for your section meetings, with a brief discussion of the question of the welfare of the milk industry, something concerning the factors that are responsible for the fact that the milk industry is not developing coordinately with the other industries. In the first place, there is not a particle of organization, as we know the word in these later years, applied to the milk business. At no stage of production or of selling is the milk business organized in the way that other businesses are organized. The men engaged in the business quite generally have resisted efforts to grade and classify milk. They have hesitated at the educational effort necessary to re-educate their people, so that they would appreciate the differences between good and bad milk, as expressed by the letters A, B, C, or other designations. They have preferred that the ordinary custom should remain of calling milk *milk*, and making good milk sell in competition on the same basis with poor milk. One of the reasons why there has not been the development of the milk business that there should have been is because of the periodic outbreaks of distrust and fear that result from periodic demonstrations of the ability of milk to carry bacteria capable of causing infection. Beyond doubt the incoming of pasteurization will reduce the number of milk outbreaks, but, nevertheless, there will be from time to time articles in the papers, telegraphed widely throughout the country, emphasizing the dangers of drinking milk, and the nondiscriminating public will refrain from drinking all kinds of milk until that particular fear has been allayed.

By reason of the fact that the milk business is a pretty good-sized business, we lose sight of the fact that it ought to be a very much larger sized business. We lose sight of the fact that it has not grown, and has not developed as have other businesses in the country, in spite of the fact that it should have grown and should have developed more than those other businesses. Milk is more nearly an ideal food, and finds a broader range of use than most any other food. It has many different possibilities aside from those for which it is at present employed. I have not time to develop those possibilities. I am going to put this single illustration and then leave you for your section work.

When the milk commission was en route to Richmond, in April, they were invited to stop off at Annapolis and visit the government dairy in connection with the Naval Academy there. We found that several years ago they had a good deal of minor digestive disorder. They investigated the cause of that disorder. They found that from time to time they had outbreaks of typhoid fever. A cursory investigation was made, and after a while it occurred to them to look into the general milk supply of that community, and particularly into the milk supply that was drawn on for the academy. They found that the academy supply was quite bad. The government was finally persuaded to put in its own dairy. When they put in the dairy they found but one location available, and that was quite near the hospital. The doctors at the hospital did not want the dairy near their hospital. They said, "It will fill our hospital with flies." In reply to that the people in charge of the dairy said, "Well, if you will look after your flies, we will look after our flies, and we will promise not to disturb your hospital with the dairy flies if you will promise not to disturb our dairy with the hospital flies." They built a dairy that was very clean. In order that there might be no flies they took proper care of the manure. They not only went after the flies in the stable, but they distributed fly-traps out over the pasture in order to catch those flies that in fair weather stayed out of doors. In consequence of that fact they have been very much more disturbed by hospital flies than the hospital has been disturbed by dairy flies. Immediately the milk is drawn, it is chilled. They have a chilling apparatus in close proximity to the place where the milk is drawn. Then the milk is kept cold and is consumed by the students in a relatively short while. The cows are tuberculin tested. They are examined by veterinarians from the Bureau of Animal Industry. In fact, the entire installation has been under the direction of the Bureau of Animal Industry. The milk goes over there to the boys with an exceedingly low bacterial count, clean and cold, and it is consumed within a few hours.

Now the point to my story is this: There are 700 students in that academy. In olden times there were one hundred and twenty sick days per month, on an average, from minor digestive disorders. You will understand we are not talking now about babies: we are talking about great husky, double-jointed, naval cadets—men whose digestive apparatus can better withstand disease than can the digestive apparatus of the average adults of the community. By sick days, we mean days excused from duty. One hundred and twenty sick days a month would mean that each student would have an average of about one-fifth of a sick day during the month. When they put in this milk the number of sick days from digestive disorders materially decreased, so that in no month since the dairy was installed have they had more than twenty sick days from minor digestive disorders, and they have had no illness that was even presumptively a milk-borne illness. They have decreased the excuse rate to as low as one-sixth of what it formerly was, at the maximum. That is to say, the maximum rate since this new milk was used is but one-sixth of the rate before it was used. There have been months when there have been no sick days and other months with five and six and seven and eight days off duty, as compared with one hundred and twenty. Twenty was the worst month that they have had, and that happened to be a month when they had a lot of football games, taking the boys off the campus.

The second point is this: Those 700 boys consume 300 gallons of milk a day. There is not a community in America that has one-quarter of that quartage. There is no community in America that has anything like that quartage, and if there was a grade of milk on the market that was comparable with the grade of milk that is being supplied to the Naval Academy students the consumption of milk would be very much increased over the amount at present consumed. There would develop, along with greater consumption, other uses for milk that would still further increase the amount consumed, and of course that would carry with it a still greater development of the milk industry.

Dr. Mohler: I believe I voice the sentiments of all present when I say that we are very grateful to Dr. Evans for his kindness in coming such a long distance for the purpose of presenting this interesting address to us, and the chair will now entertain a motion for a vote of thanks to Dr. Evans.

Dr. Lowe: Mr. President, it affords me great pleasure to move that a vote of thanks be extended to Dr. Evans. (Motion seconded.)

Dr. Mohler: It has been moved and seconded that a vote of thanks be extended to Dr. Evans for his kindness in presenting this instructive address to us this morning. Are you ready for the question? (Cries of "Question.") All in favor, please arise. Be seated. Those opposed?

Dr. Evans, it gives me great pleasure to extend to you the vote of thanks of this Association for your kindness in making this pleasing address to us this morning. I believe the Secretary has an announcement to make.

THE SECRETARY: Mr. President, it is necessary to make a little change in the program this morning with reference to section work. The Section on Surgery will be held in this room. The Section on Sanitary Science and Police will be in room 2, for the reason that it is necessary to use a lantern in connection with some of the papers. The Section on Medicine will be in room 3, at the end of the hall. The change is between the Section on Medicine and Sanitary Science and Police.

DR. LOWE: Mr. President, Dr. Evans in his remarks very kindly stated that if our Secretary would furnish him with a list of the members of this Association, he would personally see that each member received a copy of the report that he has alluded to. Therefore I would like to move, sir, that the Secretary furnish such a list to Dr. Evans, so that we may benefit by his kindness. (Motion seconded.)

DR. MOHLER: It has been moved and seconded that the Secretary be instructed to furnish a list of the members of this Association to Dr. Evans, in order that the Public Health Reports may be sent to the various members. Are you ready for the question? (Cries of Question.) All in favor please say aye; opposed, no. The ayes have it, and the Secretary is so instructed.

Is there any further business? If not, the Chair will entertain a motion to adjourn.

A VOICE: I move we adjourn. (Motion seconded and carried.)

GENERAL SESSION

FRIDAY AFTERNOON, September 5, 1913

THE PRESIDENT: Gentlemen, you will please come to order, and we will go on with our proceedings. The opening address this afternoon was to have been delivered by Dr. Theobald Smith, Professor of Comparative Pathology in the Harvard Medical School. I have received a letter from Dr. Smith which is self-explanatory and which reads as follows:

> I am starting out for a short rest, and I shall therefore not be able to attend the meeting of the Association as I had hoped to do. I trust that you will have a very profitable and interesting gathering. The *Proceedings* which come to me each year indicate that you have a nucleus of active workers, whose work is highly creditable, and who will stand by you for the year as heretofore.
>
> Sincerely,
> (Signed) THEOBALD SMITH.

The next in order is the report of the Committee on Resolutions, by Dr. Dalrymple, Chairman.

Dr. Dalrymple: Mr. Chairman, the following is the report of your Committee on Resolutions.

REPORT OF THE COMMITTEE ON RESOLUTIONS

By W. H. Dalrymple, Chairman

E. H. Shepard	S. H. Ward
G. A. Johnson	George B. McKillip

Control of Hog Cholera

Whereas, The control of hog cholera is of the greatest importance to the hog-raising industry of the country, therefore

Be it Resolved, That the Committee on Diseases be requested to investigate and present a special report, at the next meeting of this Association, on the control and eradication of hog cholera.

Normal Temperature of Domestic Animals

Whereas, The published average normal temperatures of the domesticated animals, as well as wild animals in confinement, are conflicting and lack uniformity; therefore

Be it Resolved, That a request be made to the Federal Bureau of Animal Industry to furnish this Association, at its next meeting, statistics on the normal temperatures of the different domestic animals which come within the scope of their work.

New York Milk Commission

Resolved, That this Association endorse the recommendations of the New York Milk Commission as published by the United States Public Health Service, vol. xxviii, No. 34, August 22, 1913, with the exception that we do not consider it advisable at this time to recognize any particular score-card.

Falsified Tuberculin and Mallein Charts

Whereas, The veterinary profession has been assailed and criticised because of some of its members having falsified tuberculin and mallein test-charts, and others issuing certificates for emigrant shipments that were not in conformity with the laws or regulations of the state or province to which such shipment or shipments were destined, thereby causing the shipper more or less inconvenience and expense and casting reflection upon the profession as a whole, therefore,

Be it Resolved, That this Association condemn such action, and,

Be it further Resolved, That this Association urge that each state or province that has not already done so, enact at an early date legislation forbidding the falsifying of any tuberculin or mallein test-chart or issuing a certificate upon the health of any live-stock shipment that does not conform to the law of the state or province to which such shipment is destined, and,

Be it further Resolved, That a copy of this resolution be sent to the Governor and Live-stock Sanitary Board or Commission of each state and province of North America.

Preventive Treatment of Hog Cholera

Resolved, That the recommendations contained in the following memorial from the U. S. Livestock Sanitary Association, through its Secretary, Prof. J. J. Ferguson, be endorsed by this Association.

Memorial

To the Members of the American Veterinary Medical Association in Convention Assembled,

Gentlemen: As the result of much study and observation in connection with the slaughter of large numbers of hogs at packing houses under United States Government inspection, we deem the following observations of timely importance to the members of your Association and of even greater interest to the farmers and stockmen whom you serve.

We recognize the Niles-Dorset serum for the treatment of hog cholera as the most valuable agent now employed for this purpose. We recognize that in the hands of competent veterinarians this serum may be safely administered and prove of great economic value. We also believe that in the hands of the average farmer and unskilled operator the use of this serum may cause serious damage to portions of hog carcasses. We believe that improper serum, the use of dirty syringes, accompanied by general unsanitary conditions after treatment, will result in serious damage.

As the proper area for inoculation is still an open question, we wish to suggest that some place other than the ham be properly designated as suitable for the purpose. There is a probability of ham inoculation causing abscesses not discoverable until the ham is sliced for use.

So serious has the situation become that one packing firm has undertaken a series of comparative experiments, in which groups of live hogs are being vaccinated in the neck, shoulder, flank and ham. These groups will be kept separate, slaughtered separately and injury to the carcasses carefully compared by United States Government inspectors.

We wish to bring this matter strongly before the attention of the American Veterinary Medical Association, with a recommendation that the matter be investigated, and if possible some action taken to check this preventable damage.

In our opinion serum should be used only by competent practising veterinarians. The use of serum by farmers and incompetent laymen should be discouraged as far as possible.

Respectfully submitted,
J. J. FERGUSON.

OUR GUESTS

Resolved, That this Association desires to express its sincerest thanks to the distinguished gentlemen who were our guests on this occasion and added so much to our pleasure and entertainment.

LOCAL COMMITTEE ON ARRANGEMENTS

WHEREAS, The success of our annual meetings is, in a large measure, dependent upon the labors of the local Committee on Arrangement and Entertainment; and,

WHEREAS, The splendid success of our fiftieth anniversary meeting reflects the greatest credit upon the members of the local committee, including the ladies; therefore,

Be it Resolved, That the best thanks of this Association be tendered to each and all of those who have in any way contributed, locally or otherwise, to the magnificent success of this meeting; and

Be it further Resolved, That this Association desires to extend its thanks to all those who have aided in the literary success of our program.

European Study Tour

Resolved, That the European Study Tour for Veterinarians, planned by Dr. A. Eichhorn for American veterinarians in connection with their attendance at the International Veterinary Congress, be endorsed by this Association, and that members be advised to make this tour if practicable for the purpose of study and improvement.

Eradication of Tick Fever

Whereas, It is the constant purpose of the American Veterinary Medical Association to imbue its members with the highest ideals of professional progress; and

Whereas, In pursuance of this policy it desires, wherever the achievements of its members merit it, to commend and give impetus to any measures devised for the furtherance of efficiency of veterinary medicine; and

Whereas, The Agricultural Departments of the Federal Government and of the several states of the South have, through their cordial and effective coöperation, made notable progress in the eradication of the cattle-tick (Margaropus annulatus); and

Whereas, The eradication of the cattle tick from the Southern States of America is of national importance, involving the development of the cattle industry of more than seven hundred thousand square miles of territory; and

Whereas, The area now quarantined because of the tick, when free, will produce thirty millions more cattle, worth nearly one billion dollars; and

Whereas, The early termination of this work requires the discontinuance of the practice of shipping cattle infested with ticks from the quarantine area to free market points for immediate slaughter; and

Whereas, It is the judgment of this Association that splenetic fever, or "tick fever," should be subjected to the same restraints as is tuberculosis, glanders, hog cholera and other contagious, infectious and communicable diseases; therefore

Be it Resolved, That the Association congratulates Drs. Curtice, Butler, Mohler, Dalrymple and all others who have participated in the stupendous sanitary work thus far accomplished through tick eradication; and

Be it further Resolved, That this Association record itself in favor of an amendment to the Act of Congress, dated May 29, 1884, which will prevent the interstate movement of cattle for any purpose whatsoever, when infested with cattle ticks; and

Be it further Resolved, That a copy of these resolutions be forwarded to the Hon. Secretary of Agriculture of the Federal Government and to the Governors of the several Southern States and to the Chairman of the Committee on Agriculture of each House of Congress.

President Mohler: Gentlemen, you have heard the report of the Committee on Resolutions. What action will you take?

Dr. Hoskins: I move that the report be received and that we proceed to act upon the resolutions separately.

Motion seconded and passed and each resolution was read and adopted.

Dr. Ranck: Mr. Chairman, in reference to the place for the inoculation of hogs, suggested by Professor Ferguson's memorial, I would say that since the first day of January, the state of Mississippi has distributed about 750,000 c.c. of anti-hog-cholera serum. Heretofore, we have been inoculating hogs in the deep muscles of the hams, but on account of this very feature that Prof. Ferguson calls attention to, we believe that the best place in which to inject the serum is in the muscle of the neck lying just back of the ears or between the ear and the point of the shoulder. There is a great disadvantage in injecting hog cholera serum into the hams, especially in our part of the country, where the hogs are apt to have pyemia, because of the fact that dirt gets into the place of injection. If a large quantity is injected under the skin, it is apt to produce an irritation, which causes the animal to scratch itself or to wallow in the mud, in order to relieve the discomfort of the irritation, and for that reason we have found that it is much better to inoculate the animal in that part of the anatomy which is just back of the ear. Then if an abscess develops it is of less consequence than it is in any other part of the anatomy. I am very glad that Prof. Ferguson brought this out. I think it is a very important point.

Dr. Mohler: The next item on the program is the report from the Association of College Faculties and Examining Boards. Is Dr. Stewart in the room? Dr. Stewart does not appear to be here. So we will proceed with the next order of business.

I will now call for the delayed report of the International Commission for the Prevention of Bovine Tuberculosis.

REPORT OF THE INTERNATIONAL TUBERCULOSIS COMMISSION

J. G. Rutherford, Chairman

Veranus A. Moore	J. W. Flavelle
John R. Hurty	W. D. Hoard
John R. Mohler	W. C. Edwards
J. J. Ferguson	Frederick Torrance
E. C. Schroeder	C. A. Hodgetts
T. W. Tomlinson	Mazyck P. Ravenel

M. H. Reynolds, Secretary

Mr. President and Gentlemen: During the last year, various members of the Commission met more or less frequently, but at their last meeting the attached resolution was adopted. At the meeting of September 4, 1913, consideration was given to several important questions. After careful deliberation the following resolution was passed:

Resolved, That the Commission has been watching and studying the advancement in knowledge concerning bovine tuberculosis and its control, but does not feel that any radical changes in its report can be recommended at present. It asks for continuance.

There were several subjects discussed, particularly with reference to the use of tuberculin, and its value in detecting latent cases, and various methods of control. The work which this commission is doing consists largely at present in individual investigations, and this report is all that can be decided upon at the present time. It has further studied the use of tuberculin and the method of control, and it does not seem wise to change any of our previous recommendations until further positive and conclusive evidence is available.

President Mohler: You have heard the report of this Commission. What will you do with it?

Dr. Kinsley: Mr. Chairman, I move its adoption. (Motion seconded.)

President Mohler: It is moved and seconded that the report of the Commission on the Prevention of Bovine Tuberculosis be adopted. Any remarks?

Dr. Lyman: Mr. President, does that include the continuance of the Committee?

Dr. Cary: If that is not provided for, it should be included in the vote.

President Mohler: I understand that the motion included the whole thing. The report asked for a continuance of the commission.

Dr. Lyman: I just wanted to make that point certain, Mr. President.

President Mohler: That seems to have been taken care of. Are you ready for the question? All those in favor of the adoption of the report of the Commission will say aye; those opposed no. It is adopted.

President Mohler: The next order of business is the report of the delegates appointed to attend the meetings of other organizations, and as long as Dr. Dalrymple is right here I will ask him to make his report as a delegate to the Farmers' National Congress.

Dr. Dalrymple: Mr. President, in response to your request, I attended the meeting of the National Farmers' Congress held in New Orleans last fall. I have no particular report which will be of interest to this session. The work of the Congress was largely devoted to other matters. There was a good deal of political matter and things of that character. We were, however, very welcome as representing this great body at that association meeting.

President Mohler: The next is the report of the delegates appointed to attend the International Conservation Congress. Is the chairman, Dr. George H. Roberts, in the room?

If not we will hear from the delegates to the International Congress of Hygiene and Demography, Dr. Schroeder, Chairman.

REPORT ON THE FIFTEENTH INTERNATIONAL CONGRESS ON HYGIENE AND DEMOGRAPHY

Delegates

E. C. Schroeder, Chairman
D. E. Buckingham B. T. Woodward

The Fifteenth International Congress on Hygiene and Demography was in session at Washington, D. C., from September 23 to 28, 1912, in consequence of an invitation extended by the United States Government and accepted by the Fourteenth International Congress while in session at Berlin, Germany, in September, 1907.

The magnitude of this Congress, representative as it was of all those agencies that contribute to the prevention of suffering and disease, the prolongation of life, the enhancement of efficiency etc., may be judged from the fact that, in pursuance of a joint resolution of the Congress of the United States, the diplomatic officers of the United States were instructed to invite the governments to which they were accredited to participate, and to explain that the invitations were meant to include also important state, provincial and municipal governments.

Another joint resolution of the Congress of the United States requested the President of the United States to invite the various states of the Union to participate.

Acceptances to the invitations thus issued by the Government of the United States were received from thirty-two foreign countries and forty-seven states and the District of Columbia.

The Congress was divided into two divisions and these were subdivided into nine sections and two sub-sections, as follows:

Division I—Hygiene

Section

I. Hygienic Microbiology and Parasitology.
II. Dietetic Hygiene; Hygienic Physiology.
III. Hygiene of Infancy and Childhood; School Hygiene.
IIIa. Sub-section on Mental Hygiene.
IV. Hygiene of Occupations.
V. Control of Infectious Diseases.
VI. State and Municipal Hygiene.
VIa. Sub-section on Sex Hygiene.
VII. Hygiene of Traffic and Transportation.
VIII. Military, Naval, and Tropical (Colonial) Hygiene.

Division II—Demography

IX. Demography.

In addition to general, section and joint-section meetings there were numerous special meetings, at which addresses of a popular and semi-popular character on subjects of health were presented, and an extensive exhibit which was divided into thirteen groups, as follows:

Group.

I. Vital Statistics and Demography.
II. Growth and Nutrition; Food.
III. The Hygiene of Infancy and Childhood (including Prevention of Infant Mortality and School Hygiene).

Group.
IV. The Physiology and Hygiene of Exercise.
V. Housing.
VI. Industrial and Occupational Hygiene.
VII. Communicable Disease.
VIII. State and Municipal Hygiene.
IX. Care of the Sick; Life Saving.
X. Hygiene of Traffic and Transportation.
XI. Military, Naval and Tropical Hygiene.
XII. Sex Hygiene.
XIII. Mental Hygiene.

Only a cursory examination of the program and the incomplete volume of abstracts of the papers read at the Congress, copies of which accompany this report, will make it clearly apparent that a simple record of the impressions received by any one of several delegates to a Congress of this kind would make a voluminous but far from complete report, much too long to be read at a meeting of this Association, much too long for busy men to write when we know that we may look forward hopefully to an early and complete report on the Congress by those of its members to whom this important task was entrusted. Hence, in this brief report only a few subjects that may prove of special interest will receive attention.

One impression, pleasing to all whose sympathies are wounded by human suffering, which must have been gained by everyone present at the Congress, is that our large manufacturing and commercial establishments are constantly and rapidly increasing their activities for the preservation of the health of their employees. Whether some or all of these concerns were first driven to the good work by law, or whether selfish consideration proved to them that health and efficiency are twins, of which the latter suffers too much in the absence of the former to insure satisfactory dividends, is less a matter of interest to us than the fact that large sums of money are being used, under expert supervision, to protect health and life against dangers incident to special occupations, and also against dangers that are not appurtenant to special kinds of work.

Another impression, equally pleasing, is that the public is opening its eyes wider every day to a plain recognition of the rights of children, or those members of the race whose health and happiness, and not the pecuniary benefits that may be derived from the work their little hands can do, should dominate the thoughts of every sane adult.

It is harrowing to think of little boys and girls, who should be spending the time they are not at school in play, working from 10 to 14 hours per day at monotonous, mind-killing tasks, and of the tendency of such work to hamper their physical, mental and moral development. Let us hope that the time will come soon, and it cannot come too soon, when every community will have and enforce laws regulating the amount and kind of work children may do, the number of hours they may be kept at work, and the minimum age at which they may be put to work.

A less pleasing impression was made by the manner in which the fight against the social evil was conducted. We may question whether some of the addresses, to which promiscuous audiences listened, and some of the exhibits placed before an indiscriminate public, were beneficial or harmful. For example, one chart was on exhibition that proclaimed in large letters that there are 300,000 public prostitutes in the United States and that the number of clandestine prostitutes is ten times as great. If this statement is true, and it is hoped that no person who has faith in womanly virtue will credit it, we have better reasons for believing that the human sexual appetite is too strong to be reasonably controlled than to justify the hope that the social evil can be suppressed or materially reduced.

It is not necessary to be superciliously prudish in the discussion of sexual matters, but this would be better than public addresses and exhibits that supply the opportunity for susceptible youths and inexperienced girls to make such matters a topic of conversation among themselves. The instinct upon which the preservation of the species depends is second only to that of self-preservation. Can we hope that this potent instinct will be kept in better subjection if the barriers of reserve ages of experience have established between the sexes are broken down? Separate classes of men and of women for instruction on sex hygiene, so that mothers may know how and what to teach their daughters and fathers their sons, or even separate classes of boys and girls if this is found to be desirable, merit more consideration as a rational and hopeful procedure. In addition to this more stringent laws against all forms of procuration, and the extension and more active enforcement of such laws, should be advocated.

Eugenics, a subject often discussed in connection with the social evil, received about as much attention at the Congress as would be expected from its present popularity. It was gratifying to note that we still have with us prominent, thoughtful men who realize that we have been doing much good work for the improvement of the race without resorting to those methods of breeding that have been found satisfactory for establishing and maintaining desirable varieties of live-stock. It is well to discourage propagation among those who are affected with hereditary taints and defects, and to do all in our power to limit procreation among those whose offspring, as a foregone conclusion, cannot become efficient and desirable citizens, but our knowledge remains too meager to enable us to substitute other principles for the guidance of young men and women in selecting their conjugal partners than reciprocal inclination. Such inclination should be guided as far as possible by beginning early in life to educate the tastes of young people to conform to high standards.

Among the scientific papers read at the Congress the new facts brought out in two, both by Dr. M. J. Rosenau, formerly Director of the Hygienic Laboratory of the U. S. Public Health Service and now Professor of Preventive Medicine and Hygiene at Harvard University, should be intensely interesting to us. One fact was that the common stable fly (*Stomoxys calcitrans*) is capable of transmitting infantile paralysis from affected to susceptible individuals. Seemingly, when this mode of transmission is considered, as an interval of time elapses after the fly has bitten an infected individual and before its bite becomes infectious, we are dealing with another instance in which a microörganism of a disease affecting mammals multiplies within or has an intermediate stage in the body of an insect.

But the stable fly, with which we are all acquainted, cannot be regarded as the only means for the dissemination of infantile paralysis, and this was shown by other papers on the subject.

The other fact was that guinea-pigs exposed under conditions of poor ventilation to horses and dogs develop a specific anaphylactic sensitiveness to the blood serum of these animals. The exposure of the guinea-pigs was under conditions that insured their protection against anything emanating from the horses or dogs that did not reach them in the air in a volatile state. As anaphylaxis is a proteid phenomenon, this indicates, contrary to previous belief, that proteid substances are capable of being volatilized. If this is true, it throws great, additional light on problems relating to ventilation and gives us a previously unknown reason for the evil effects that attend the breathing of impure and, more particularly, repeatedly respired air.

A paper on anthrax, presented by two English investigators, dealt with cases of the disease in persons who handle hides, wool and hair, and proved conclusively that more effective measures than are now in use should be opposed to the danger of infection from these sources.

A paper on representatives of the Gärtner group of bacilli, isolated from the tissues of laboratory animals, led the writer to conclude that the dog probably is of more importance as a source of the meat-poisoning bacillus than has been previously recognized, and that dogs dying from distemper may eliminate vast numbers of these organisms and be a source of infection for meat-producing animals. It is not claimed that the bacillus is etiologically related to distemper; on the contrary, it is characterized as a secondary invader, the entrance of which into the tissues of the dog is facilitated by the presence of the disease.

At every great gathering for the discussion of problems concerning hygiene, sanitation and the prevention of disease the need of coöperation between the medical and veterinary medical professions is demonstrated.

The subject of bacillus carriers received due attention, and it is well for us to bear in mind that the apparently healthy carriers and disseminators of disease germs, alike among persons and the lower animals, are being proved by constantly increasing evidence to be among the very important factors that contribute to the perpetuation of infectious diseases.

Several papers were presented on rabies, in one of which a plea was made for united efforts on the parts of the governments of the United States, Canada, Mexico and Central America for the eradication of the disease from the North American Continent. This plea should have our endorsement, as it seems possible, with proper action and no great capital other than common-sense, to eliminate rabies in the course of time from the world's list of preventable diseases that affect many species of animals.

The milk supply, a subject of great interest to the veterinary profession, received much attention. It was encouraging to note that the prophylactic truth, that it is economically impossible to produce milk under existing conditions that is unfailingly safe for use in the raw state, is rapidly gaining general recognition.

How thoroughly the best-informed men on milk dangers are beginning to recognize and proclaim that it is not safe to use raw milk may be judged from a statement recently made during a meeting of the American Association of Medical Milk Commissions by one of the most prominent men in America on matters concerning certified milk. Without attempting to repeat the exact words used by this man, who had abundant selfish reasons, which he generously suppressed, to argue in favor of the use of raw certified milk, the import of his statement was as follows: "I am a specialist on infant feeding; many infants are fed in accordance with my instructions; I prescribe certified milk, boiled."

A paper on samples of milk bought in the open market at Chicago showed that pasteurized milk as sold in that city is cleaner than raw milk, and that it contains less than one-fourth the number of bacteria.

Those who have made comparative tests of commercially pasteurized and ordinary raw market milk are probably agreed, though they know that commercial pasteurization is far from reliable, that even unsupervised, commercial pasteurization effects an appreciable reduction in milk dangers.

A chart, exhibited by the U. S. Bureau of Animal Industry, showing the reduction in the frequency of disease among the cadets at the U. S. Naval Academy, consequent to the installation of a dairy herd at the Academy under the supervision of the Bureau of Animal Industry, and the use of the milk from this in the place of milk bought from various dealers, should be regarded as one of the emphatically instructive exhibits of the International Congress.

Dr. W. A. Evans, formerly Health Officer of Chicago, in commenting on the Naval Academy milk supply during a symposium on "Hospital Milk" at Washington, D. C., after referring to the reduction in the number of cases of gastro-intestinal trouble among the students from 120 in April, 1911, to 6 in April, 1912, and 20 in April, 1913, effected by no other determinable change than the installation of the Academy's own dairy herd, expressed himself as follows: "These boys are husky, double-jointed, athletic students. The drop from 120 in 1911 to a maximum of 20 is significant. If raw milk will produce disease in a student body it will surely do so in hospitals and with babies."

The members of our Association should recognize that the available evidence points with unmistakable directness to the conclusion that all those precautions that insure the purity, cleanliness and freedom from infection of milk must be practised and further developed, and that the cleanest and purest and best obtainable milk should be made truly safe by pasteurization under efficient official supervision. We should not make the mistake to believe that pasteurization justifies carelessness in the production and handling of milk, or that care in production and handling is a sufficient guarantee against milk dangers to justify the omission of pasteurization.

For the benefit of those who are still influenced by the long and widely entertained fallacy, that heat reduces the food value or the digestibility of milk, it will be well to add, that all the obtainable experimental and clinical data on the relative value of raw and heated milk prove conclusively, when the milk of one species is used as food for another species, apart from any consideration for the living, virulent disease germs that may be concealed in raw milk, that such differences as may exist are in favor of boiled milk.

It may seem that too much attention has been given in this short report to milk, but this idea can hardly be maintained if we recall that hundreds of epidemics, including typhoid fever, diphtheria, scarlet fever, streptococcal sore throat, etc., have been traced to milk; that impure milk is responsible for a large proportion of the harrowing mortality among artificially fed infants; that impure milk must be charged with causing a reduction in the vital resistance of those who use it which makes their bodies more vulnerable to disease from all kinds of exposure; that milk is the best culture medium for bacteria among all articles of food, and that the protection of public health against milk dangers is a question of special interest to the veterinary profession.

An interesting paper on the handling and transportation of perishable products dealt with questions that should be of interest to us, as, for instance, whether it is better to ship food animals long distances alive or after they have been dressed. Poultry, when shipped alive long distances to our cities, often arrives in a thin, fevered condition, undesirable for food, while it may be dressed long distances from the point of consumption and arrive, through the use of refrigerator cars, in perfect condition. The same applies to other food animals.

Another timely paper called for better protection of food against contamination through the agency of dust, flies, bacillus carriers, etc.

But to refer, only in short sentences, to the numerous important papers presented to the Congress by workers from all parts of the world would make this report entirely too long, hence no further attempt to do so will be made.

One or two subjects, however, must receive some attention, and the first of these is the "Role of Bovine Tuberculosis in the Production of Human Tuberculosis." The Section on the Control of Infectious Diseases devoted an entire afternoon to this subject. Dr. A. Weber, of Berlin, Germany, made an address in which he called attention to the various confirmed facts we must take into account in our estimates of the importance of bovine tuberculosis as a source of human infection. The lesions caused by bovine tubercle bacilli in human bodies have a different location than those caused by human bacilli, and with rare exceptions are closed lesions from which no infectious material is expelled in a way that will cause the disease to spread to other individuals. The human tubercle bacillus is practically incapable of causing tuberculosis in cattle under natural conditions of exposure. The conclusion which logically follows is that bovine tubercle bacilli have no epidemiological and human tubercle bacilli no epizoetiological significance.

We must admit that an analysis of all the proved facts and the elimination of all controversial and hypothetical material stamps this conclusion as valid, but not as final, and in this sense we should accept it.

When we consider the tendency of tubercle bacilli to vary in their morphology and virulence, so that more or less complete transformations from one type to another through the selective influence of environment are easily conceivable, and that strains of tubercle bacilli that have been found to be virulent for species of animals for which they are not typical are continuously, through successive generations, virulent for such species, and that, aside from the recognition of the tubercle bacillus as the essential cause of tuberculosis, we are still in the dark about much that concerns the etiology of the disease, especially in human subjects, we must realize that additional light may at any moment make a temporarily reasonable conclusion wholly untenable.

Dr. William H. Welch, of Baltimore, protested against permitting the relation of bovine tuberculosis to public health to remain a subject that consumes the time of national and international gatherings to the exclusion of other important subjects. As no correctly informed person doubts now that bovine tubercle bacilli are a cause of serious and fatal tuberculosis among human beings, or that human health must be protected against such bacilli, or that public health can be protected efficiently against bovine infection through the continued enforcement and extension of meat inspection laws and the supervised pasteurization of all milk that is not above suspicion, we may give this protest our indorsement.

This does not mean that we should omit tuberculosis from our discussions, because to us an association of veterinarians, the occurrence of the disease among the lower animals is, and promises to remain for some time to come, a subject of supreme importance, but less as a factor influencing public health than as a condition that urgently needs attention because of its effect on the economic production of that portion of the human food supply which is derived from animals.

In conclusion a few words must be said about statistics, a subject that received much attention in the Division on Demography of the International Congress, and the importance of which is not easily exaggerated.

Active measures are in progress in all the civilized countries of the world to make statistics more reliable and comprehensive and to give them a uniform character so as to facilitate comparisons between those collected in different countries and different parts of the same country. Our Association, with its particular interest in animal industry, should bear in mind in this connection that statistics relating to animals, and the conditions that affect animals, are fragmentary and unsatisfactory, and that much improvement is possible and desirable.

Statistics are the foundation on which economy must stand; they are, as one writer expresses it, "An appeal from imagination to fact." At present our statistical knowledge regarding important economic conditions like the occurrence of hog cholera, infectious abortion, tuberculosis, etc., among food animals, is so imperfect that no one is in a position to estimate within many millions of dollars how much loss these diseases cost the nation per annum.

Our Association should give this subject careful consideration, and determine whether it can take some action that will promote the collection of more accurate and comprehensive statistics relative to animal industry.

Vice-President Moore in the chair.

Dr. Moore: Gentlemen you have heard the report of Dr. Schroeder. What shall be done with it?

Dr. Kinsley: Move that it be adopted. (Motion seconded and passed.)

Dr. Moore: The next item on the program is the report of the delegates to the National Association for the Study and Prevention of Tuberculosis.

REPORT ON THE NINTH ANNUAL MEETING OF THE NATIONAL ASSOCIATION FOR THE STUDY AND PREVENTION OF TUBERCULOSIS

Delegates
E. C. Schroeder, Chairman
J. G. Rutherford Hulbert Young

The National Association for the Study and Prevention of Tuberculosis held its Ninth Annual Meeting on May 8 and 9, 1913, at Washington, D. C. The attendance was large and varied and proved an encouraging demonstration of the rapidly growing interest in the campaign against the commonest and most destructive of preventable diseases, and of the tendency among all classes of persons, irrespective of their professional training or business interests, to strive harder than ever before to control the causes of unnecessary suffering and premature death.

During the meeting many phases of the tuberculosis question were discussed, but nothing radically new was presented. The papers and discussions in the Pathological and Clinical Sections, however, showed that remaining, intricate and perplexing questions concerning the etiology, pathology and treatment of tuberculosis are receiving careful attention, and that competent investigators are actively engaged with studies on the relation of different types of tubercle bacilli and acid-fast bacteria to each other; the chemistry of tubercle bacilli and their products; the factors that influence susceptibility for and immunity against tuberculosis, etc.

In the Sociological Section abundant evidence was given to prove that the fight against tuberculosis is seriously handicapped by two conditions: First, inadequate laws relative to notification and segregation, and, second, unsatisfactory facilities for the care of advanced, and more particularly indigent advanced, cases of tuberculosis.

The prevailing idea seemed to be that tuberculosis should be reported and recorded like other communicable diseases. As to segregation, it was recognized that the widespread and common occurrence of tuberculosis and its insidious, chronic character introduce elements that make the enforcement of quarantine regulations, such as we have against more acute and less common infectious diseases, impracticable and, because of the often great usefulness of careful and intelligent consumptives and the comparatively small danger that they may spread infection, undesirable.

But the time has come to recognize that careless, indifferent and ignorant consumptives, who either refuse to observe the precautions necessary for the safety of others or who cannot be taught to practise such precautions, should be placed under proper restraint. To permit proved sources of danger to remain in our midst unrestrained, simply because their elimination requires the curtailment of the liberties of various individuals who are indifferent to the harm they do, is an unpardonable manifestation of weakness rather than a commendable, altruistic expedient. In other words, no matter how great our sympathy for the poor victims of tuberculosis may be, it should be less depressing to contemplate the sorrows of a few segregated, careless or ignorant consumptives than the affliction of the possibly numerous, innocent victims of the tubercle bacilli disseminated by such consumptives.

The members of the American Veterinary Medical Association, informed as they are on the subject of tuberculosis, should stand out uncompromisingly for the obligatory notification of all cases of tuberculosis and the forcible segregation of those cases who lack proper regard for the safety of others.

That the facilities to care for advanced cases of tuberculosis are unsatisfactory was shown by the report of a special committee on hospitals. It was pointed out that it is difficult to induce the better classes of poor consumptives to enter the institutions that are open to them, and that those who enter, as a rule, remain only short periods of time. The conditions described to exist in some institutions explain the disinclination of consumptives, who are not absolutely obliged to do so, to enter or remain in them. More and better hospitals and sanitariums are urgently required for the victims of tuberculosis; they would pay royally for themselves by aiding to reduce the frequency and intensity with which the public is exposed to tubercle bacilli.

In a paper on "Tuberculosis and Public Health" it was shown that the methods in the campaign against tuberculosis are defensive rather than preventive. That is to say, most efforts are being directed against the harm tubercle bacilli do rather than against tubercle bacilli. While advantage is being taken of the fact that the development of tuberculosis in infected bodies can be retarded and often checked, too little attention is given to the prevention of infection with tubercle bacilli. It is encouraging to know that this phase of the fight against tuberculosis is being discussed. To those who contemplate the reduced mortality from tuberculosis in conjunction with data which indicate that no reduction has occurred in the frequency with which human bodies are invaded by tubercle bacilli, such as tuberculin tests and autopsy records, it must be apparent that stronger and more direct efforts should be made to strike at the essential cause of the disease, the tubercle bacillus. Segregation of dangerous consumptives and notification are steps in the right direction.

The defensive campaign against tuberculosis, the fight against the development of tuberculosis in infected bodies, a true fight for higher standards of living, has done much good. It has added to the length of life generally and has served to educate the public on the laws of hygiene and the penalties that follow their violation. But it has caused so little reduction in the frequency with which tubercle bacilli enter human bodies that it is questionable whether a reduction in the mortality from tuberculosis would remain if a return was made, after years of labor, to the lower standards of living that existed prior to the campaign against tuberculosis and other educational campaigns for the preservation of health.

One subject of special interest to the American Veterinary Medical Association, "the relation of tuberculosis among the lower animals to human tuberculosis," remained practically unmentioned during the Ninth Annual Meeting of the National Tuberculosis Association. But we have no reasons to find fault with this, because, at its Seventh Annual Meeting, the Tuberculosis Association indorsed resolutions specifically recognizing, in the following language quoted verbatim from the resolutions, "that the bovine tubercle bacillus causes serious and fatal tuberculosis in human beings," and, at its eighth annual meeting, indorsed resolutions inviting closer coöperation between the American Veterinary Medical Association and the National Association for the Study and Prevention of Tuberculosis. The invitation was based on, as the resolutions expressed it, "the close relationship between the work of the National Tuberculosis Association and the work of the veterinary medical profession."

Though nothing of marked importance has been added during the last year to our knowledge on the relation of the different types of tuberculosis to each other, many problems on this important subject remain to be solved, and there is no better way to gain the data for their solution than a close coöperation between those who are versed in comparative anatomy, pathology and bacteriology and those who are making tuberculosis a subject of special study. It is hoped that many of the members of our great American, National and International, Veterinary Association will take advantage of the invitation extended to them to become members of and active workers in the National Tuberculosis Association.

In conclusion it is desirable to say a few words about the action of the National Tuberculosis Association on the subject of the so-called "Friedmann Cure" for tuberculosis. No subject aroused keener or more general interest, and it was plainly evident that the country at large was very eager to have a clear statement from the National Association on the widely advertised, reputed virtues of this so-called "cure."

At a general meeting an excellent paper on the "Friedmann Cure" was read, with the consent of Surgeon-General Rupert Blue, of the United States Public Health Service, by Dr. John F. Anderson, Director of the Hygienic Laboratory of the U. S. Public Health Service and Chairman of the Board of Officers commissioned to investigate the "Friedmann Cure."

One clause in Dr. Anderson's paper, because of the condemnation of the Friedmann claims it must convey to the minds of men who are versed in comparative physiology and pathology, should be particularly interesting to us. I quote from Dr. Anderson's paper as it appeared in the Weekly Reports of the U. S. Public Health Service of May 16, 1913: "He (Friedmann) specifically disclaimed that his culture possessed either curative or immunizing properties against tuberculosis in the lower animals, but had no objection to an investigation of his claims that it was completely avirulent for them."

If any member of the American Veterinary Medical Association still inclines favorably and hopefully to the belief that Friedmann has done anything noteworthy for suffering humanity, a contemplation of the quoted specific disclamation should leave him in no doubt about the truth.

Directly after the reading of Dr. Anderson's paper the Tuberculosis Association approved the following resolutions with only one dissenting vote:

WHEREAS, Widespread publicity has been given to the claims of an alleged cure for tuberculosis; therefore

Resolved, That there is no information before the National Association for the Study and Prevention of Tuberculosis to justify the belief that any specific cure for tuberculosis has been discovered which deserves the confidence of the medical profession or the people; therefore

Resolved, That it is the duty of the public to continue unabated all the present well-tried agencies for the treatment and prevention of tuberculosis.

The only dissenting vote was cast by a man who ranks high as a worker against tuberculosis, but, instead of being favorable to Friedmann, it was prompted by a feeling, which many others shared, that the resolutions were entirely too mild in their condemnation of an unpardonably shameless attempt to commercialize human suffering.

Though it is desirable that false claims that arouse vain hopes which can terminate in nothing but bitter disappointment; that retard beneficial activities against suffering and thus increase its total, and that divert the available means to fight evil into channels through which they are worse than wasted, should be condemned with unmistakable emphasis, the dignified, personal resolutions of the Tuberculosis Association merit approval.

One lesson the Friedmann affair should teach, and if it does this thoroughly, we may yet rejoice because of the good that has come out of it. The lesson is, and it should be taken to heart by the entire public, both lay and professional, that we must not permit ourselves to be influenced by unproved claims that lack the real indorsement of even a single recognized authority on the subject to which they relate, no matter how promising or alluring such claims may be or how notorious they may have become or how brilliantly they are advertised. If this lesson could be universally learned the patent medicine industry, with all its sins, would speedily die of starvation.

President Mohler assumes the chair.

President Mohler: Gentlemen, you have heard the report of the delegates to the National Association for the Study and Prevention of Tuberculosis. What is your pleasure?

Dr. Mayo: Mr. Chairman, I move that the report be accepted and adopted. (Motion seconded and carried.)

Dr. Mohler: Dr. Stewart is now in the room, and we will call for the report of the Association of College Faculties and Examining Boards.

Dr. Stewart: Mr. President and Gentlemen: I have no written report covering the work of the Association of College Faculties and Examining Boards, and I must be content to make a very brief oral report of the work which is being done by that organization. I would say that the association convened as scheduled according to the published program, and held three special sessions on the first three afternoons of this week. The sessions were very well attended, there being representatives from twelve colleges, and I think seventeen state examining boards, which fact to your reporter is most encouraging. The presentation and discussion of the several papers presented were carried on with much interest, which indicates that the problems presented are taking substantial hold of those especially interested in that phase of veterinary progress. As an outcome of the meetings provision was made for the appointment of a committee which will undertake to collate statistics of the state boards of the entire country. This committee is composed of men located in various parts of the United States, and they propose to procure a range of information which will serve as a guide to all of the boards as to what is being done in the several states, and also to propose plans looking to the adoption possibly of somewhat uniform customs in the various states. From the discussion it appears to me that marked progress has been made, and that we should look forward next year to a substantial report, and to an outline by which we can legitimately accomplish the things sought—uniform examining boards in the several states, and the uniform statement to various educational institutions of what will be required for men to become eligible to practise in the several states.

The body elected officers for another year, showing that they are in earnest and expect to perpetuate the work until at last they shall feel that it will be wise to adopt some form of reorganization better fitted, perhaps, to accomplish the purposes for which this organization was instituted.

President Mohler: Gentlemen, you have heard the report of Dr. Stewart for the Association of College Faculties and Examining Boards. What action do you suggest?

Dr. Murphey: Move its adoption, Mr. President. (Motion seconded and passed.)

President Mohler: The next order of business is the report of the Executive Committee. Dr. Stewart, are you ready to report for the Executive Committee?

Dr. Stewart: Mr. President, I had intended, and want now before reading the report of the Executive Committee to call attention to the fact that there was published a short time ago a report by Dr. Helmer with reference to the State Examining Boards. There will be some copies of it in the hands of the Secretary of the society. There was also published a list of the examining boards, and their officials. I will have a number of copies of those, and if any of you care to secure a copy you can get it.

President Mohler: Are you ready to report now, Doctor, for the Executive Committee?

Dr. Stewart: Yes I have two reports to submit. (See Reports of Executive Committee, page 184.)

President Mohler: Gentlemen, these two reports of the Executive Committee are now before you for consideration.

Dr. Lowe: Mr. President, I move you sir, that we receive both reports, and proceed to act on the recommendations seriatim.

(Motion seconded and carried.)

Dr. Stewart: The first item is—"On motion duly seconded and passed it was voted to recommend to the Association that the names of Prof. Francis Hutyra, Prof. Robert von Ostertag and Sir Stewart Stockman he elected to honorary membership in this Association.

Dr. Mayo: I move its adoption.

(Motion seconded and passed.)

Dr. Stewart: The next recommendation of the Committee is that the following vote be passed: "That it is the sense of the Association that the raising of large sums of money by local committees to use for the entertaining of this Association should be discouraged for the reason that it prevents the presentation of invitations to hold our meetings in many places where it would be for the advantage of the Association and the profession that it should go.

Dr. Kinsley: I move its adoption.

Motion seconded.

Dr. Baker: Mr President, I should like to inquire if an amendment to that recommendation altering the by-laws is in order.

President Mohler: This is the report of the Executive Committee and a motion for the adoption of the recommendation has been made. You can speak on it, but it is not open for amendment that would change the by-laws.

Dr. Baker: It seems to me that this is the proper time and place for an amendment to the by-laws.

Section 5 of Article 14 provides that all proposals for alterations or amendments to the constitution or by-laws shall be offered in writing, and no alteration proposed shall be acted upon until it has been referred to the Executive Committee, and presented anew by them to the Association. All members should be notified at least ten days previous to any action thereon, and no alteration or amendment shall become effective except by a two-thirds vote of the members present at the time of the meeting.

The President: There is no change contemplated, Doctor, in the by-laws. This is merely a recommendation of the Executive Committee with reference to the raising of funds for the entertainment of the members of the Association.

Dr. Baker: Well, the point that I wish to make, Mr. Chairman, in this connection is that while I think it is a good thing, it does not go far enough to suit me. When the individual members of any state wish to invite this Association to hold its annual meeting they usually appoint a local committee of arrangements, and that local committee of arrangements has to provide a meeting place for this Association—has to hire a hall. Now, I think, on general principles, that is wrong. This Association should provide its own meeting place. If it costs anything to rent a hall, the Association should pay that bill, and not leave it to be paid for out of the subscriptions from the local members of the Association. While I am in sympathy, of course, with the resolution as presented, or the recommendation of the committee, it does not go far enough. I think it should be specifically provided for that where a local committee hires or engages a hall for the use of the Association, the Association itself should pay for it.

President Mohler: I would suggest, Doctor, that you prepare such an amendment and have it in before the close of the meeting. If you wish to make your suggestion in the nature of a proposed amendment, you should write it out and submit it to me before the meeting adjourns. It can then go in the report, and be acted on next year.

There is a motion to adopt the recommendation of the committee.

Dr. Ackerman: What is the object of making this recommendation without providing something to take care of it. It seems to me that if we are going to adopt this recommendation it should also have something providing for the hiring of halls. If we do not expect the committee of local arrangements to provide a hall, there should be something included to take the place of the present custom.

Dr. Baker: Mr. Chairman, I should like to hear that resolution read again.

Dr. Stewart reads recommendation.

Dr. Baker: That resolution is specific. It uses the word "Entertainment." What does entertainment mean. I claim it does not include the procuring of a meeting place. That is not entertainment. The recommendation does not include a hall, and it would still remain that a local committee of arrangements would have to pay for a hall, and my position is that that is a matter of business that concerns the Association and it should be attended to by the President and Secretary. Entertainment and business it seems to me are distinct. Now, I know by personal experience and observation that the meeting places of this Association in the various states where we meet have entailed considerable expense, and I maintain that it is not a part of the entertainment.

A Member: In addition to that I might add that there are a great many necessary expenses that are for the time being laid upon the shoulders of the local committee: for instance, the printing of programs. All of us know that the printing of programs, and other things like the furnishing of badges, cost a good deal of money. The furnishing of badges particularly, costs a good deal of money, and it seems to me that we should provide for not only hiring the hall, but a lot of other things which are absolutely necessary.

President Mohler: Are you ready for the question? All in favor of the adoption of the recommendation of the Committee please say "Aye;" those opposed "No." The ayes seem to have it, and it is so voted.

Dr. Stewart: "On motion duly seconded and passed it was voted to recommend to the Association that the proposed amendment to Section 2 of Article III of the constitution providing that members of the Executive Committee now appointed by the President shall be elected by the Association be rejected."

Dr. Cary: Move its adoption.

(Motion seconded and carried.)

Dr. Stewart: "On motion duly seconded and passed it was voted, to recommend to the Association that the proposed amendment to Article VI of the by-laws concerning the election of six members of the Executive Committee for various terms be rejected."

Dr. Cary: Move its adoption.

(Motion seconded and passed.)

Dr. Stewart: "On motion duly seconded and passed it was voted to recommend to the Association that the proposed amendment to Section I of Article VIII of the by-laws, requiring applicant for membership to be a member in good standing of a regularly organized veterinary association, where the same exists in the state or province from which the applicant comes, be rejected."

Dr. Lyman: I move its adoption.

Motion seconded.

Dr. Hoskins: Mr President, I do not know who the author of that resolution was, but it impresses me as possessing a great deal of merit, particularly so if the Executive Committee is going to continue the present custom of admission of members. Every year there is published in the announcement or in the program that all applications for membership to be considered at the meeting shall be in the Secretary's hands for thirty days, yet, just as regularly as that is published or announced, we continue to receive applications for membership even up to the last day of the session, to pass upon them without any knowledge, either of the standing of these men, or as to whether they have been members of the Association, or whether they have been in good standing in their own states, unless by accident someone will furnish that information. If the Association will adapt itself to the proposition that the Secretary must have those applications thirty days before the meeting, so that proper examination can be made into the qualifications of all applicants I should be content, but we all know that that is not done, and under the circumstances as they exist I am perfectly willing to vote in favor of some change in our regulations which will enable us to know more about some of these men that are being taken in.

President Mohler: I think the purpose of this, Dr. Hoskins, was to let the matter go over until the Committee on Reorganization could make a full report.

Dr. Hoskins: Then under the circumstances, Mr. President, I am perfectly willing to vote in favor of the recommendation of the Committee. If, on the other hand, they are not going to do this, then I certainly think it would be wise for us to have some evidence of a man being in good standing in his own state. The cutting out of one or two men is not going to interfere with our progress, and it is always an easy matter for a man who is in fair standing in his own state, for him to get into fellowship with the local association. If he is a member of the local association it will help him when he comes to put in his application here. If he comes here without having applied for membership in his local association, then it is fair that the question should be raised, "Why don't he become a member and qualify in that way?" If the Association will stick to the rule already laid down, and demand that applications for membership should be in the hands of the Secretary within thirty days of the opening of the meeting, then I should be willing to vote in favor of the recommendation of the Committee, but otherwise I think this is a very good plan.

Dr. Lyman: It strikes me, Mr. President, that this recommendation has a good deal to commend it, and I wish that before we vote on this recommendation that the Executive Committee would tell us why they sent in this adverse report. I would ask if the chairman of the Executive Committee would not tell us why the Committee reported in favor of the rejection of this proposition.

Dr. Stewart: I would say in reply to that, Mr. President, that as I recall the discussion before the Executive Committee, it was felt that we were on the verge of adopting a comprehensive plan of reorganization, and that if we made many changes in the present by-laws, they would be of very short duration, and it would give out a false impression; and that it would not be wise to adopt a ruling of this kind, if the plan of reörganization was going to require something else. That seemed to be the trend of the discussion. The members of the Committee seemed to think that as long as we were seriously considering a new form of permanent reorganization, that it would probably be unwise to add to the present regulations for the admission of members.

Dr. Lowe: Mr. President, that being the case, I think it would be well, so far as I am concerned, to rest the matter where it is, but I do want to say in this connection that I firmly believe that a man should be in good standing in his own state association in order to be eligible to membership here. I think it is a shame for a man who is not in good standing at home, to come and knock at our door for admission here. If it is proposed to simply defer the matter for one year, or to such a time as the reorganization plans can be worked out, then I am perfectly willing to vote for the recommendation of the Committee.

Dr. Leech: There is another thing about that matter, Mr. President. Perhaps there may be two associations in a state, and it is impossible to tell which is the regular state association, and which may not be. They might not concur among themselves, but if they were organized along the lines of incorporation which would be in harmony with the requirements of this Association, they might both be recognized. I think you have in mind what is being referred to in the case I mention.

THE PRESIDENT: Are there any further remarks? If not, I will put the question. All in favor of this recommendation will please give their consent by saying "Aye;" those opposed, "No." The ayes seem to have it and it is so voted.

DR. STEWART: "On motion duly seconded and passed, it was voted to recommend to the Association that the recommendations of the Committee on College Investigation with reference to the subjects required to be taught in schools, the graduates of which are eligible to membership in this Association, as mentioned on page 175 of the *Proceedings* for 1912 be adopted."

Let me say in explanation of this recommendation, that certain things are set forth there which should be taught in all veterinary colleges, the length of the course is given, as well as the minimum number of hours in the various courses which the colleges should teach. This refers to Circular 150 issued by the Bureau of Animal Industry which covers these points. I believe the Secretary can read them to any one of you who may care to have them read. I think the most of you understand the nature of this recommendation.

DR. CARY: Move the adoption of the recommendation.

(Motion seconded and passed.)

DR. STEWART: "On motion duly seconded and passed, it was voted to recommend to the Association that the Committee on College Investigation be continued for the next year, and that a fund of not to exceed five hundred dollars be set aside to pay their expenses.

DR. LYMAN: Move its adoption.

(Motion seconded and passed.)

DR. STEWART: "On motion duly seconded and passed it was voted to recommend to the Association that the list of veterinary colleges approved by the Committee on College Investigation as complying with the requirements of this Association be adopted as follows:[1]

Alabama Polytechnic Institute, College of Veterinary Medicine.
Chicago Veterinary College.
Cincinnati Veterinary College.
Colorado State College, Division of Veterinary Medicine.
George Washington University, College of Veterinary Medicine.
Grand Rapids Veterinary College.
Indiana Veterinary College.
Iowa State College, Division of Veterinary Medicine.
Kansas City Veterinary College.
Kansas State Agricultural College, Veterinary Department.
McKillip Veterinary College.
Michigan Agricultural College, Department of Veterinary Medicine.
New York State Veterinary College, New York City.
New York State Veterinary College, Ithaca.
Ohio State University, College of Veterinary Medicine.
St. Joseph Veterinary College, beginning with graduates of 1914.

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[1] See the following explanation of the Chairman of Executive Committee to the effect that this recommendation is not intended to be retrospective relative to colleges that have already been recognized but which are not now in existence. (Ed.)

San Francisco Veterinary College.
State College of Washington, Veterinary Department.
Terre Haute Veterinary College.
United States College of Veterinary Surgeons, beginning with graduate of 1914.
University of Pennsylvania, School of Veterinary Medicine.

Dr. Cary: Move its adoption. Motion seconded.

Dr. Lyman: As I understand it, Mr. Chairman, all this means is that these colleges, or that their graduates, shall be eligible hereafter the same as they have been from year to year, but I would like to inquire of the Committee what becomes of the graduates of the American Veterinary College, Columbia Veterinary College, Harvard University Veterinary Department, Laval University, Ontario Veterinary College, Royal College of Veterinary Surgeons, University of California, and other colleges that are not mentioned in that list, the graduates of which are at times applying for membership in this Association? I think there should be some resolution, either a substitute recommendation, or else a separate recommendation to provide for post graduates of those schools that we have recognized. I would like to have the Executive Committee, through their chairman, tell us what becomes of those graduates. I am interested in this particular case because I am a graduate of a college that no longer exists, and I think there are others in this Association who are in the same fix. At any rate, there are graduates of those schools that certainly will seek recognition here from time to time.

Dr. Stewart: In reply to that inquiry I would state that the feeling was that this recommendation was not retrospective in character. The committee did not visit any of the colleges which are not now in existence, included among the names read by Dr. Lyman; consequently, their report could not affect them. They recommended that these colleges which are included in the list embodied in the Committee's Report be put on this list because they had been visited and investigated by the Committee on College Investigations. As I understand the report of that Committee, it really intended that we should use the same list that we had been using, with the exception of the Ontario Veterinary College, and that graduates from previously recognized schools not now in existence would be in the same relation to this Association as they were before the adoption of this list.

Dr. Lyman: That is if a graduate of the Columbia Veterinary College makes application he could get in?

Dr. Stewart: Surely. I think the Columbia College is in the previously recognized list.

President Mohler: Are you ready for the question. All in favor of this recommendation say "Aye;" those opposed, "No." It is adopted.

Dr. Stewart: "On motion duly seconded and passed it was voted to recommend to the Association that if the Committee on Reorganization be continued, that it be directed to file with the Secretary, on or before March 15, 1914, such report or reports as the Committee, or any of its members, has prepared, and that the Secretary shall thereupon cause such reports to be printed in pamphlet form and distributed to the members of the association for study and suggestion. Also, that the Secretary be directed to furnish, within thirty days, to each member of the Committee a copy of the several recommendations made by any of the officers and committees relating to changes in the constitution and by-laws which were submitted during the meeting of 1913."

Dr. Kinsley: Move the adoption of the recommendation.

Motion seconded.

President Mohler: It has been moved and seconded that the recommendation be adopted. Are there any remarks?

Dr. Campbell: Mr. President, I move as a substitute, that the recommendation be rejected, and that the Executive Committee be instructed to send in to the Secretary an entirely new report made up from various plans submitted, and that it be published in our annual report for this year, so that the matter may be acted upon as was contemplated in the resolution creating this Committee and inaugurating the proposed change in our constitution.

In support of this motion I wish to emphasize that this recommendation of the Executive Committee completely defeats all efforts at reorganization for the time being, and if this action be taken as a precedent and followed at subsequent meetings it would effectively block any action. It does not place any more information in the hands of the Committee on Reorganization than it had before and it prevents such information as this Committee has been able to collect from being placed before the Association or being considered by it next year. It merely delays action for another year and it seems to me that it is unwise to do that. If it is desirable that a reorganization be made, now that after the red tape has been gone through, we should proceed with a consideration of the matter next year. If a reorganization is not desirable we should reject the proposal at our next meeting and have done with it.

Under this plan of procrastination, which the Executive Committee asks us to adopt, there appears at first glance to be an advantage in that the new committee on reorganization will have information in this subject not available for the present Committee in the President's annual address, report of the Secretary, report of the Librarian, report of the Committee on Intelligence and Education, and perhaps some other reports, but this advantage is more apparent than real. The present committee has before it the reports of similar officers and committees last year. A new committee, which would report at our next meeting, would be confronted by an entirely new set of reports and those made at this meeting will then be as much or as little out of date as the reports made at Indianapolis are now.

Furthermore, it seems to me the action of the Executive Committee in pigeonholing or chloroforming this report is unjustifiable because of unfairness and because of the assumption of authority that does not properly lie with it. This Association in convention assembled at Indianapolis took certain steps necessary for the consideration of a plan for reorganization two years hence, and now we have the spectacle of the Executive Committee assuming to direct the affairs of this Association and nullify an act of the whole body.

And again, shall one committee of this Association be allowed to deny another committee of the Association and the members thereof a hearing? The plans submitted by Committee on Reorganization may be inadequate, unwise or even vicious, in the opinion of the Executive Committee; very well, let the committee so report and the plans or some one of them be published in our annual report so that they may be approved, amended or rejected altogether at our 1914 meeting, as was contemplated when resolution initiating this movement was introduced and adopted last year.

One other thing Mr. President, and I am through. This is of little moment in comparison with the matter I have already mentioned, but as a member of the Committee on Reorganization I wish it known that it has not been lost upon us, and that is the very unusual action on the part of the Executive Committee by which this Committee on Reorganization is denied an opportunity to present its report to this Association and to have it incorporated in the annual report. Such action reflects unfavorably upon the character of the work of the committee having this matter in hand. Perhaps deservedly so, but let me remind you that the preparation of the report of the Committee on Reorganization was not an easy task. At their own request other committees have been given additional time in which to complete their reports, as for example, the Committee on Anatomical Nomenclature, which has twice failed to make a complete report, and has as often been granted extended time. In contrast to this, presumably because the report of the Committee on Reorganization does not meet with the approval of the Executive Committee, it is refused all consideration and a new committee recommended. I am sure no member of this committee would protest against such action if taken by the Association, but I do protest against such action on the part of another committee, and I further believe that in making this recommendation the Executive Committee has gone outside of its province and acted in a hasty manner and without due consideration of the matter.

Dr. Kinsley: When I made my motion for the adoption of this recommendation, my understanding, Mr. President, was that it was to be inaugurated next year.

Dr. Campbell: As I understand it, the object of the recommendation of the Executive Committee was to prevent this report of the Committee on Reorganization from being published in the annual report. A covert method of preventing legal publication and action at our next meeting. In other words this recommendation seeks to delay action on the matter of reorganization for another two years, without specifically saying so. All I ask is that the Executive Committee report to the Association at this session the plans of the Committee on Reorganization and then if any member desires the matter put in cold storage for a couple of years, let him make a motion to that effect in open meeting and give those opposed to postponement an opportunity to be heard.

Dr. Kinsley: Mr. President, this Committee has labored hard and long, and they do not like having their report perhaps thrown out in this Association. I, for one, however, have a very meager understanding of it as it was read, and I doubt if there is one in ten that actually knows what the recommendations really are. We have not had the necessary opportunity to study it. I think that the Committee on Reorganization on such an important matter as this can be criticised for not having had their report in the hands of the members of the Association, so that the members would have been sufficiently informed about it when we came to this meeting. It seems to me that they have been rather lax in their work. This report signifies that it is not going to go over for another year before it can be finally acted upon by the Association, anyway. I do not know that I am in favor of it. At any rate, any change which is made in our system of organization should only come about after we have had an opportunity to inform ourselves about it, and my understanding was that the report of the Executive Committee was designed to give us an opportunity to study the plan before being required to vote upon it at our next meeting. Further, as I understand the gentleman who has just preceded me, he said that future work was to be performed by a different committee. I think he is mistaken about that. I think the recommendation stated specifically, or called for a continuance of the same committee on this subject. The report was simply to make them do their work in better shape, so that the members could understand it and act intelligently. That was my reason for moving the adoption of the recommendation.

President Mohler: I think that the substitute motion was not seconded. Therefore, the question is on the motion to adopt the recommendation of the Committee. All those in favor say "Aye;" those opposed, "No." The ayes have it, and the recommendation is adopted.

Dr. Stewart: "On motion duly seconded and passed, it was voted: That the application of James R. Mahaffy of Wilmington, Delware, for membership in the Association be granted."

Dr. Lyman: I move that the by-laws be suspended and the Secretary be directed to cast the ballot for Dr. Mahaffy, as a member of the Association.

(Motion seconded and carried.)

Dr. Marshall: By direction of the Association I now cast the ballot for the election to membership of James R. Mahaffy, of Wilmington, Delaware.

President Mohler: Dr. James R. Mahaffy is declared a member of the Association.

Dr. Stewart: I have another report of the Committee here, Mr. Chairman. Shall I take up the recommendations now.

President Mohler: I think that is in order.

Dr. Stewart: "On motion duly seconded and passed it was voted to recommend to the Association that a Special Committee on Glanders be continued, and that a sum not exceeding $300 be set aside by the Treasurer for the expenses of said committee."

Dr. Kinsley: Move its adoption. (Motion seconded and passed.)

Dr. Stewart: "On motion duly seconded and passed it was voted to recommend to the Association that a sum not exceeding $1000 be set aside by the Treasurer for the expense of the Committee on Legislation."

Dr. Kinsley: Move its adoption. (Motion seconded and carried.)

Dr. Stewart: "On motion duly seconded and passed, it was voted to recommend to the Association that the by-laws be suspended and that the salary of the Secretary be increased to the sum of $750 for the next year."

Dr. Cary: Move its adoption. Motion seconded.

President Mohler: It is moved and seconded that this recommendation be adopted. All in favor manifest the same by saying "Aye," those opposed, "No." There seems to be no opposition. The ayes have it, and the recommendation is adopted.

Dr. Lyman: I move the adoption of both reports as a whole.

(Motion seconded and passed.)

Dr. White: Mr. President, I move the suspension of the by-laws for the purpose of considering four applicants for membership.

Dr. Hoskins: Do you mean four applications which have not been before the Executive Committee?

Dr. White: They have been before the Executive Committee. No action was taken by the Committee.

Dr. Hoskins: I would like to know who the men are before voting for a motion of that kind.

President Mohler: You better read the names. It requires unanimous consent to suspend the by-laws for the election of active members.

Dr. White: I made that motion for the consideration of the following applications:

F. M. Cahill, D.V.S., St. Joseph Veterinary College, 1908, St. Joseph, Missouri; Ernest I. Patterson, D.V.S., D.V.M., St. Joseph Veterinary College, 1913, Mound City, Missouri; J. E. Shelton, D.V.S., St. Joseph Veterinary College, 1908, Arkansas City, Kansas; William D. Tipton, D.V.S., St Joseph Veterinary College, 1911 and 1913, Emporium, Kansas.

These men are all graduates of St. Joseph Veterinary College, a college which we recognize today. Two of them have taken an extra year's work in order to qualify for the civil service examination, and they are very anxious to become members. There is no way that I can get them in without a suspension of the by-laws.

Dr. Lyman: Before we can consider this, I think we will have to adopt a motion to recognize the graduates of this college for 1913. We will have to have two motions before you can get those graduates in.

Dr. Hoskins: I understand in answer to Dr. Lyman's suggestion, that we should recognize this college for 1913, because two of these applicants are graduates of that year, and only these two men would be eligible.

Dr. White: The other two have been graduates for over five years. We have a provision in our by-laws making them eligible.

Dr. Mohler: I just want to read the by-laws, Article XIV, Section III: "A suspension of the by-laws may be made by unanimous consent at any meeting of the Association for the election of active or honorary members." Are you ready for the question. All those in favor of suspending the by-laws will please say "Aye;" those opposed, "No." The by-laws are suspended.

Dr. White: Now, I move that these four men be elected to membership.

President Mohler: Is there any second to that motion.

Dr. Murphey: Mr. Chairman, I would like to know whether these men are eligible for appointments under the Bureau of Animal Industry.

President Mohler: I do not keep those kind of things in my mind, but I do not think that this Association has to take into consideration what the Bureau of Animal Industry is doing. I do not think that would have any effect on the right of this Association to this action. However, I could not answer that question.[1]

Dr. White: I will answer that they are.

Dr. Caldwell: Mr. President, I may say that one of these men, I understand, is a member of the B. A. I. at present. Another one of them has been admitted to the examination by the civil service commission, but he has not taken it. He has a paper, however, admitting him to the examination. The other two have complied with the requirements of the Bureau of Animal Industry in preparing for eligibility to the civil service examination.

Dr. Lyman: In order to make this proper, Mr. President, I move that the Secretary cast the ballot for the election of these four men.

Motion seconded.

President Mohler: It is moved and seconded that the Secretary cast the ballot of the Association for the election of these four men to membership. All in favor say "Aye;" those opposed, "No." The ayes have it.

Dr. Marshall: By direction of the President I cast the ballot of the Association for the election to membership of these four candidates whose names were just read.

President Mohler: I declare the applicants elected to membership.

Dr. Stewart: Mr. President, when we were discussing the report of the Executive Committee, objection was made to one of the recommendations by Dr. Campbell, because it would defer the alteration of the constitution and by-laws. If it is compatible with our by-laws, and I believe it is, I would move you that the report of this committee consisting of two different plans of reorganization be accepted as proposed amendments to the constitution and by-laws. I propose that in the form of an amendment, so that there may not be any question of the regularity of this matter when it comes up before us. In making this proposal, I do not wish to vitiate the action of the committee, but simply to save any question. I think the Committee on Reorganization should be fully prepared before the 15th of March. I would recommend that they begin to prepare before the 15th.

President Mohler: According to the by-laws, all that is necessary, Doctor, is to leave that signed statement with the Chair and I will recognize it. Dr. Baker has a similar proposition in mind, and if you will kindly let me have the memorandum, it can be put into the *Proceedings*.

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[1] B. A. I. Circular 150-C, provides that graduates of the St. Joseph College prior to 1914 will be required to have had one year's practice and to take an additional year's instruction at this college, before they are eligible for Bureau appointment. (Ed.)

Proposed Amendments to the By-laws

The two plans of the Committee on Reorganization.

(See Reports of Doctors Hart and Campbell, on pages 260 to 272.)

Dr. Baker: Mr. Chairman, I have prepared a proposed amendment to the by-laws.

"Whereas, the renting of a hall for the use of this Association at its annual meetings has been left to the local Committee on Arrangements in the state where the meetings have been held, and the expenses of the same have been defrayed by the local committee,

Be it Resolved, That the expenses of such a hall in future be defrayed by the American Veterinary Medical Association."

I have signed that, Mr. President, and it is also signed by Dr. Robert S. MacKellar.

There is another one that I would like to present.

"Resolved, That the annual dues of this Association be raised from three dollars to five dollars per year."

President Mohler: These four proposed amendments will take the usual course and be printed in our *Proceedings*.

Dr. Cary: Mr. Chairman, I wish to introduce an amendment to Section 5 of Article III of the by-laws to read as follows:

"The Secretary shall receive an annual salary of seven hundred and fifty dollars and such expenditures as may be necessary in attendance at the annual meeting following his election."

President Mohler: Will you kindly write that out and sign it, Doctor?

Dr. Cary: I have written it out, Mr. Chairman, and it is signed already. I will hand it to the Secretary.

Dr. Murphey: There was a motion, I think, in regard to the report of the Committee on Anatomical Nomenclature, that this be referred to the Publication Committee. I would like to make a motion in regard to the publication of that report with the annual report, and with the further suggestion that when the committee reports are completed, that inasmuch as this is a matter which particularly interests teachers and members of the faculties of the various veterinary schools, that they be furnished with copies of it, so that when it comes up for final action they will be in a position to make any suggestions which they may think necessary.

President Mohler: I believe it has already been referred to that Committee. It will be published in the *Proceedings* and I suppose the members of the faculties of the colleges will have copies of the *Proceedings*. I think, Doctor, that your motion was covered in the action which was taken last Tuesday or Wednesday, when the matter came up.

Dr. Murphey: I am not so sure that what I have provided in the latter part of my motion was covered by that action, Mr. President. That provides for the printing of the complete report, which is of interest to teachers, so that they can look it over before the Association convenes. With three thousand or more different terms to look over, it is impossible to do that and give it sufficient consideration if it is left until we gather in convention. My idea was to have a temporary report printed similar to that which is to be done with the reorganization plan, and then to have copies of that report furnished by the Association directly to those interested. I think that it should be done within ninety days before the annual meeting.

Dr. Stewart: Mr. Chairman, I think I understand what our friend is driving at, and I would be pleased to second the motion if the doctor would make the time limit less than ninety days. I think the committee would have some difficulty in getting it ready in nine months. During the past year, I think that they used the summer vacation for a general conference regarding it, and they took up about one-half of it. If the mover of the motion will make the time limit thirty or forty days before the meeting, I should feel that the committee could carry it out.

A Member: What was the motion?

President Mohler: Doctor, will you be good enough to state your motion again so that the members in this part of the hall can understand it?

Dr. Murphey: I move you, Mr. President, that the official report of the Committee on Anatomical Nomenclature be printed in pamphlet form, and distributed to the teachers and members of the faculties in the different veterinary colleges not later than thirty days before the annual meeting.

Dr. Stewart: That meets with my suggestion, Mr. Chairman, and I will be very glad to second the motion.

President Mohler: It has been moved and seconded that the report of the Committee on Anatomical Nomenclature be published as a separate pamphlet and furnished to interested members thirty days before the next annual meeting.

Dr. Mayo: Will not this report be printed with the regular report of the Association?

President Mohler: As I understand it, it will.

Dr. Mayo: Then it will probably be out long before that time. I do not see any particular object in printing it in pamphlet form afterward, because the report will certainly be out by that time.

Dr. Stewart: It is possible, Mr. President, that there is a little misunderstanding about it. As I understand it, there is considerable of the work yet to be done. The proposition involved in the motion was that the full report of the committee when finished was to be printed in this way and distributed, so that when it came up for debate at the next meeting you will be fully prepared to debate it.

Dr. Barnett: When are these reports to be gotten out?

President Mohler: As the Chair understands it, the report which was made at this meeting was only a partially completed report. The idea now is to have this partial report in addition to the work which is to be done by the committee in the next eleven months printed in a separate pamphlet and distributed to interested parties thirty days before the next annual meeting.

Dr. Barnett: Then, as I understand it, the preliminary report which has been before this committee will be printed in our *Proceedings*.

President Mohler: That is the idea, and the labors of this committee during the next eleven months will be added to this year's report and published in a pamphlet.

Dr. Baker: This motion, Mr. Chairman, carries with it a prospective expenditure of a sum of money to publish this pamphlet. Should not an appropriation be included in the motion?

President Mohler: The committee was voted an appropriation of $300, I believe, Doctor, for necessary expenses on Wednesday morning.

Are you ready for the question? All in favor of the motion, please say "Aye;" those opposed "No." The ayes have it.

Is there any new business?

Dr. Murphey: It seems to me that there is one thing that we have not taken action on at this anniversary meeting, and that is to provide for an outline of the history of veterinary progress in this country during the past fifty years. In view of the fact that some of the men that have furnished us with a part of this history will be passing away, I would move that a committee be appointed to collect data for a history of veterinary progress in this country for the past fifty years, and that this complete report be kept in the archives of the Society and that a summary of these reports be furnished to the next annual meeting by the committee and published in the annual report.

Motion seconded.

President Mohler: Gentlemen, it has been moved and seconded that a committee be appointed to collect historical data referring to the progress of our profession for the last fifty years, and that a general summary of it be made to the next annual convention.

Dr. Murphey: The committee will probably get a good deal of information from a large number of members, which may cover the same subjects. My idea was that all of the material could be kept in the archives of the Association and a summary of it made for publication, the committee being required to edit it.

Dr. Mohler: All in favor of that motion say "Aye;" those opposed "No." There seems to be a division. All those in favor of this motion, please arise. The Secretary will please count. Now, those opposed will please arise. The ayes have it.

If there is no further business the installation of officers will now be in order.

I would indeed be unappreciative if I did not convey to you, fellow members, my many thanks for your kindness and loyalty during my tenure of this office and especially during the last five days. The success of these meetings is not only dependent upon the officers and upon the various committees, but upon the coöperation of the members as well, the privates in the ranks. Before proceeding with the installation of Dr. Marshall, I wish to express my sincere regards for the very high esteem in which you have held me, and for your assistance and careful consideration of my welfare at this present meeting.

I will now call upon Dr. Berns and Dr. Lyman as a Committee, to escort Dr. Marshall from one chair to another higher up.

(President-elect Dr. C. J. Marshall appears upon the platform.) (Cheers.)

Dr. Berns: Mr. President, Dr. Marshall, our newly elected president.

President Mohler: Dr. Marshall, in handing over to you this gavel, emblematic of the authority of this Association, I do so with the knowledge that the responsibility for the future conduct of this office rests upon broader and more capable shoulders than those possessed by the one from which this responsibility is now being removed, and in doing so, not only is the Association to be congratulated, but I congratulate you, Dr. Marshall, on the attainment of this honor.

Gentlemen of the Association, your new President, Dr. Marshall.

President Marshall: Gentlemen, in accepting this gavel, I wish to extend my hearty congratulations to the retiring president. I feel that a pony is assuming the burden of a draft-horse.

This Fiftieth Anniversity Meeting is a grand climax to fifty years of progress. I have been a member of the Association for nineteen years and have always considered that each succeeding meeting was better than the previous one, and this has been no exception. Everything must either progress or retrogress, and I have been wondering how it would be possible to beat the record of this meeting—how we could possibly reach a higher standard.

It is not possible for any individual to make this Association, as it has already been made by the able men who have preceded me. It is also impossible for any one person to break the Association, and I sincerely hope that we shall be able to maintain the high standard that has already been established.

Let us hope that many of the members present to-day may live to carry a message from this fiftieth anniversary to the centennial of the Association. It is possible that there are a number of members present who may round out the century and attend that meeting also. (Laughter.) I hope that if any such are present, they will remember this grand fiftieth anniversary meeting. It shall be my main ambition in the administration of the duties of this office to carry on the work "with malice toward none, with charity for all." I hope that this spirit will be participated in by all of the members and that you will take hold of your side of the question heartily so that we may make the beginning of the next half century another record breaker in the history of the Association.

I wish to thank you again for the honor which you have conferred upon me, an honor which, I can assure you, I regard as the highest that can be given to a veterinarian. (Applause.)

It is now my duty to introduce the other elected officers. The First Vice-President is Dr. Torrance. Is he in the room? He does not seem to be present. The Second Vice-President is Dr. Eichhorn. I am glad to appoint Dr. Lowe and Dr. Ackerman to escort Dr. Eichhorn to the platform.

(Dr. Eichhorn escorted to the platform.)

President Marshall: Doctor, I extend to you my congratulations. I congratulate not only you, but the Association on your selection. Gentlemen, Dr. Adolph Eichhorn, Second Vice-President.

Dr. Eichhorn: Gentlemen, I certainly appreciate the honor that you have conferred upon me and I will be glad always to do all I can for the welfare of the Association, and for the veterinary profession at large. Especially am I proud of this election at this time, as I contemplate being abroad next year during the fiftieth anniversary of the International Congress and I shall, therefore, be in a position to act as an official of this Association. I thank you.

President Marshall: Dr. Blair was elected Third Vice-President. I will appoint Dr. Leech and Dr. E. M. Ranck to escort him to the platform.

(Dr. Blair appears upon the platform.)

President Marshall: Gentlemen, Dr. Blair. He needs no introduction. I will turn him over to your kindly care and keeping.

Dr. Blair: Mr. President and your constituents; I have been so busy the last week that I have not had an opportunity to study our constitution and by-laws, in order to find out just what the duties of the third vice-president are, but I assume that the third vice-president has three votes, while the first vice-president only has one (laughter). I shall, of course, recognize the fact that to all of those good people who have voted for me, it will be quite appropriate to hand out all the favors I possibly can.

Gentlemen, I appreciate the fact of this election more so perhaps because it has taken place here in New York City, and for that reason I feel very grateful that this Association has been here, and that they have enjoyed themselves sufficiently to leave one of the vice-presidents in this city. I shall do in the future as I have endeavored to do in the past, all I can in my small way for the advancement of the Association. I thank you.

President Marshall: Is Dr. Archibald in the room, or Dr. Jacob. If not, the next in order is the inauguration of our new secretary. If there is anybody in the list of new officers who has my sympathy, it is Dr. Mayo. I would like to appoint Dr. Smith and Dr. Dalrymple to escort our friend to the desk.

(Dr. Mayo escorted to the desk.)

President Marshall: Dr. Mayo, gentlemen.

Dr. Mayo: Gentlemen, you all remember the old saying, that some people are born great, some achieve greatness, and others have greatness thrust upon them. I had no more idea of becoming secretary of this Association when I came to this meeting, than I had of being Minister to Mexico, and I am afraid that the post will be about as enjoyable; but, however, I will do the best I can. I thank you.

President Marshall: I hardly know how to introduce the next officer. He is getting to be a good deal of a chestnut in this Association. However, we are all glad that he has been elected treasurer again. Dr. White, I welcome you as our treasurer.

Dr. George R. White: I thank you very much, Mr. President. Now, gentlemen, it is not necessary for me to attempt to make a speech. I will say, I thank you, and I thank you more than ever before because this will round out my tenth year as treasurer of this Association. Since becoming treasurer of the Association, it has grown and prospered, and we have reached a position where we are in a thriving condition at the present time. I would like to impress upon the members the importance of paying their dues to the Secretary promptly in order to keep the wheels of this organization in motion. It is absolutely essential to have a good fund, if we are to pay our bills as they mature.

While I am on my feet, I want to mention New Orleans, because it is the unanimous consent of this meeting that the next meeting of this Association be held at New Orleans, and we, as members of the profession in the South, desire to impress upon you people up here, the fact that you will receive a most hearty welcome, and that we shall endeavor to make it a profitable meeting in every way equal to your expectations. I thank you very much.

President Marshall: Is the new Librarian in the room, Dr. Frost? If not, gentlemen, I think that completes the duties of installing the new officers into office.

Dr. Lyman: Mr. President, I want to just say a word, if I may. We have had with us for I think it is ten years a gentleman who has not been a member of this Association, but who, at the same time, has been a very active worker in preparing the annual reports of this Association. I refer to Mr. Roberts. I would like to move that as an expression of our confidence in him that a vote of thanks be given to Mr. Roberts, who for ten years has acted as our official stenographer.

A Member: I move that it be taken by a standing vote.

Motion seconded and passed.

(In a brief speech Mr. Roberts thanked the Association for its action.)

President Marshall: Is there any further business?

Dr. Baker: Before adjournment, I move that a vote of thanks be extended to the retiring officers for their courteous and energetic work in the past year.

Motion seconded.

President Marshall: You have heard the motion. All in favor of it, please manifest it by saying "Aye;" contrary, "No." It is a vote.

Dr. White: I move that a vote of thanks of the Association be granted to the New York veterinarians for what they have done to make this such a successful meeting.

Dr. Marshall: That matter has already been covered in the resolutions which have been passed, but I don't know but it would be well to give them a vote any how. Those in favor of extending a vote of thanks to the Local Committee on Arrangements will make it manifest by saying "Aye." It is unanimous and so ordered.

Dr. Mohler: If there is no further business, I move that we adjourn sine die.

Motion seconded and passed, and the convention adjourned without day.

SECTION ON VETERINARY MEDICINE

Monday Afternoon, September 1, 1913

First Vice-President George H. Roberts, Presiding
George H. Glover, Director

Vice-President Roberts: As there are men here who would like to hear one paper in this room, and one in another, it will necessitate our beginning as near on time as possible.

The first paper is by Dr. Pierre A. Fish, entitled "Physiologic Principles in Therapeutics."

PHYSIOLOGIC PRINCIPLES IN THERAPEUTICS

By Pierre A. Fish
Ithaca, N. Y.

The comparatively recent use of more exact scientific methods in clinical work has brought about a much closer relationship between physiology and practical medicine.

In the ultimate analysis the majority of diseases can be traced to a disordered condition of metabolism or tissue change. In some instances, the disease may arise from disordered digestive processes or the production of substances more or less toxic which interfere chemically with normal metabolism. In other cases it may be due to the invasion of a foreign organism or a substance produced by it as in tuberculosis or tetanus.

Recent physiologic research shows that there is an intimate chemical relationship between certain portions of the body with others and that, in all probability, there is more or less chemical relationship between all parts.

Since the time of Sir Charles Bell it has been maintained that the normal functions of the body are carried out through the nervous mechanism; that certain parts apparently more or less isolated are all under nervous control. Starling and Bayliss have shown by their discovery of the hormone secretion, in the mucosa of the intestine, that the chemical relationship is quite as important as the nervous in the digestive processes. The recognition of the chemical factor in regulating and controlling certain of the bodily functions is being extended. The active principles or hormones of the internal secretions of certain of the ductless glands produce their effects in a chemical way and their importance is shown by the fact that serious results follow their removal.

The use of drugs in the treatment of disease is founded upon the belief that they may chemically influence certain functions of the body. Such a belief seems rational when evidence is accumulating to show that the body itself is able to produce chemical substances with which to regulate or modify its various functions. It is furthermore reasonable to use for therapeutic purposes those agents which enable the body, when in health, to perform its functions normally.

The importance of the nervous factor in physiologic processes is by no means lessened but the honors heretofore accorded to it must, in many instances, be shared with the chemical factor. In primitive conditions, and because in the sequence of development, the nervous tissue is relatively late in its appearance, the chemical factor assumes still greater importance. The results produced by the excitation of protoplasm follow chemical changes whether the stimuli be of chemical origin or not, and the reaction is relatively slower than that produced by the nervous factor in later development.

The nervous and chemical factors are not antagonistic but coöperate harmoniously in the work that is to be performed. An example of this coöperation is well shown in the production of the digestive juices. The salivary secretion may be induced through the nervous mechanism before the food has actually entered the mouth. Although the taste of the food may initiate the flow of the gastric juice its continuance is effected by chemical stimuli derived from the pyloric secretin. The production of pancreatic juice, according to recent investigations, seems to be due entirely to the chemical stimuli furnished by the secretin formed by the mucosa of the duodenum. A series of events has therefore taken place originating in the nervous mechanism and merging into a chain of chemical reactions which do not antagonize but supplement the nervous activity.

In the consideration of the normal and diseased conditions it is of great importance not to overlook what might be termed the internal work of the body or those activities which are essential for mere existence. The vital activities center largely around the heart and the work it can do. Under normal conditions the energy required to drive the blood, loaded with nourishment, to the tissues and the amount of waste products poured back into the blood by the tissues represent many foot-tons of work during the twenty-four hours. If the action of the heart or circulation be interfered with by disease the work is proportionately increased until a condition may arrive when the heart is unable to support any further work from external sources and the patient must submit to a life of inactivity until finally the internal work of existence is overcome. Similarly in regard to the work done by the muscles of respiration in enlarging the diameters of the chest in order that the blood may be properly oxygenated. Normally the work is considerable, but if interfered with by pathologic conditions the daily output of energy is greatly increased.

Undoubtedly the greatest item in internal work is the production of heat. The normal work of the heart and respiratory muscles involves the liberation, as a by-product, of more than twice as much energy in the form of heat as is actually required for the mechanical work of the circulation and respiration. All living cells, from their chemical changes, contribute to the production of heat. If the cells excrete temperature as a by-product of their activity, it will follow that cells unduly active will produce a greater amount of temperature and if prolonged will result in fever; whereas cells of a low degree of vitality would produce less heat and represent a smaller expenditure of energy. As long as a cell is alive it performs the duties of metabolism and produces more or less heat. The duration of life and the various types of temperament are probably referable to metabolism. With a nervous and excitable temperament and a life period perhaps below the average we may associate cells with rapid metabolic processes; with a mild and phlegmatic temperament and a life period beyond the average we may assume that a greater economy exists in the metabolism of the cells and their normal processes continue for a longer period.

Life and heat are inseparable. If the temperature of the blood rises, tissue waste must be increased. Fever, therefore, tends to have a destructive effect upon the cells, whether it be primarily due to an increased production of heat; to a diminution of loss of heat, or to a disturbance of the normal balance between the two. If it is desired to lower the temperature in fever, the easiest method is to increase the amount of heat loss, because this is more under our control than heat production. Cold baths for instance act by removing heat from the body surface by conduction; sudorifics, by increasing evaporation. Our knowledge of the drugs which diminish the amount of heat production is limited. Alcohol, in large doses, appears to do so probably from its paralyzing effect upon the cells. Quinine, in retarding the metabolism of the cells, seems to have a similar action. Some antipyretics appear to increase the loss of heat by dilating the superficial bloodvessels and so increasing the amount of radiation from the body; while some others appear to have some action upon the heat regulating centers which have more or less control of the heat regulating mechanism.

Although the energy of the body is derived from the food, not all of the energy inherent in the food is available for metabolism. Some of this energy is utilized during the digestive processes in preparing the food for absorption and assimilation. It has been calculated in the case of a horse fed entirely upon hay that 48 per cent. of the energy of the food is expended in its digestion and absorption. There is also a variation according to the chemical constitution of the food. Proteins seem to demand more energy, carbohydrates less and fats still less. Milk, the common food of all animals in their infancy, requires the least digestive work. During the period of infancy the digestive enzymes have not reached their full period of development and although able to digest milk for tissue use they are unable to act upon the more concentrated foods in a satisfactory manner.

Carbohydrates and fats furnish the greatest amount of energy to the body. Protein may intermittently or accidentally contribute to the energy produced, but its chief function is to replace the nitrogenous material in the tissues. Under certain conditions a greater amount of protein may be retained in the body; this is exemplified in pregnancy, where it is utilized to contribute to the formation of the fetus and the increased growth or hypertrophy of the uterus and mammary glands. Likewise in convalescence from acute diseases where wasting has occurred, the tissues possess the property of retaining a larger amount of protein, in order that the normal weight and size may be regained at a relatively rapid rate.

In the body, carbohydrates are converted into sugar and a portion of the sugar may be converted into fat. Clinically there is some evidence that there are cases where the conversion of carbohydrate into fat is not well developed and as a result of the imperfect assimilation pathologic changes may occur. In some cases of glycosuria in elderly subjects the question has arisen if the condition may not be due to the sugar passing away through the kidneys instead of contributing to the formation of fat; in other words, the patient is a diabetic because he has not laid on fat.

The control of the size of the bloodvessels by means of the vasomotor nerves has a direct bearing upon the conditions of engorgement and congestion. At the present time the balance of evidence is opposed to the view that the pulmonary bloodvessels are supplied with vasomotor nerves. This, perhaps, accounts for the ease with which these vessels become the seat of passive engorgement when there is any obstacle to the outflow of blood into the left heart. In this way the lungs may serve as a reservoir for the pulmonary circulation in much the same way as the liver and spleen serve in a similar capacity for the systemic circulation. A condition of passive congestion, therefore, plays a large part in pulmonary diseases. During the expansion of the lungs in inspiration the pulmonary capillaries are increased in caliber and the circulation through the lung is facilitated. During expiration, on the other hand, the vessels are diminished in size and the circulation is more difficult. This is one reason why a patient whose pulmonary circulation is interfered with tends instinctively to keep the chest as much as possible in the position of inspiration. The absence of a vasoconstrictor supply to the pulmonary arteries also implies that adrenalin (which acts on the terminals of such nerves) can be of no use in checking hemorrhage from the lungs.

The bronchial artery supplies the pulmonary pleura and the internal mammary and intercostals the parietal pleura, while the venous blood is carried away from these parts by the azygos veins. These veins are imperfectly supplied with valves, therefore when the pressure in the right heart is raised the venous roots in the pleura become quite readily congested and effusion or hydrothorax results. The vessels in the pleura differ from the pulmonary vessels in that they are supplied with vasoconstrictor nerves. They are, therefore, more susceptible to the action of adrenalin and advantage has been taken of this fact in the treatment of pleural effusions.

The blood normally varies considerably in the proportion of its constituents. A diminution in the amount of its fluid causes greater concentration, an excess of red corpuscles and an increased viscosity. Gustave Mann has calculated that the maximum number of corpuscles which the human blood is capable of holding is 13.9 millions. A blood count of 12,000,000 must imply a very great increase in the circulation time through the capillaries. Anything which increases the stay of the blood in the capillaries permits of the abstraction of a greater amount of oxygen from it and therefore contributes very materially to the production of cyanosis.

It is becoming more and more evident that no single organ lives unto itself alone, but that the chemical changes which take place in each may be of great importance to metabolism as a whole and to the normal interchange in other organs. Although the chemical products of every organ must influence the conditions of the body to some extent, it is only when the influence is specific and the origin definite that the substance is entitled to designation as a hormone—a substance which excites chemically.

Aside from nutritive material there are, according to Ehrlich, two groups of substances which affect the body. The first group—the toxins—are closely allied in their chemical character to the proteins and are produced through the agency of living organisms. As a result of their introduction, the tissues react by the development of an antibody. The second group includes all of the common drugs, which probably act upon the protoplasm because of their molecular arrangement, producing their effect upon the cells quickly and without a period of incubation. Although repeated doses may, in some cases, set up a certain degree of tolerance, an antibody is not produced. Hormones may be assumed to belong to the second group, because if they produced antibodies, larger and larger doses would be required to perform their physiologic functions and this would defeat their own objects. Hormones may therefore be regarded as belonging to the permanent, and not to the acquired, defences of the body.

According to Langdon Brown, the general features of hormones may be stated as follows: (1) They are bodies of comparatively small molecular weight; (2) unlike ferments, they are not destroyed by simple heating, but may lose power on prolonged boiling; (3) they are rapidly destroyed by oxidizing agents; (4) they are destroyed in the tissues which they excite and do not escape in any of the excretions; (5) they are not, as a rule, absorbed unaltered from the alimentary canal. Iodothyrin, the active principle of thyroid extract, is an exception to this rule, probably because the thyroid gland originally discharged its secretion into the alimentary canal by the thyroglossal duct.

In a practical way, it would appear that typical hormones should be employed only by local application or injection; since they can be added to boiling water, without loss of strength, the question of sterilization is much simplified; that as they disappear, probably by oxidation in the tissue they excite, they are more useful in producing temporary rather than prolonged effects. The following table modified from Starling gives the more commonly recognized hormones:

Origin	Hormone	Reacting organ
Suprarenals	Adrenalin	Sympathetic nervous system
Stomach (pylorus)	Gastric secretin	Stomach (fundus)
Duodenum	Secretin	Pancreas, liver
Thyroid	Iodothyrin	Nervous system, skin, etc.
Ovaries	......	Uterine mucosa
Fetus	......	Mammary gland
Gastric Mucosa	Hormonal	Intestinal musculature

Adrenalin is a chemical body whose presence is apparently essential to the activity of the sympathetic nervous system. Langley has made the important generalization that the action of adrenalin on any part is the same as stimulation of the sympathetic nerves to that part. This is of especial interest in view of its formation by a structure of sympathetic origin. The most striking action of adrenalin is the rise of blood pressure resulting in part from the constriction of the vessels. This effect is not common when taken by the mouth, probably because its absorption is largely prevented by the vasoconstrictor effect upon the vessels of the gastric mucosa. For this reason it has been used successfully in checking hemorrhage from the stomach, and for the relief of vomiting. Its action upon the stomach would also suggest its use for hemorrhage of the intestines. It has apparently been so used with some success but the fact that adrenalin, like the sympathetic, checks peristalsis and tends to close the sphincter muscles, makes it somewhat doubtful if it can get by the pylorus. Exner has found that the intraperitoneal injection of adrenalin delays the absorption of a poison introduced into the stomach or peritoneal cavity; thus strychnine required twenty times as long to produce its toxic effect. This gain of time is most valuable, and suggests the administration of a full dose of adrenalin pending the use of other remedies.

In addition to its vasoconstrictor effects adrenalin is a powerful stimulant to the heart, augmenting its action like the sympathetic, but intravenous injections must be used to produce this action. In azoturia, "heart failure" may occur as the result of the production of toxic substances in the tissues; with this condition it is not unlikely that vasomotor paralysis prevails and the use of adrenalin should be of benefit in raising the blood pressure as well as stimulating the heart. Occasional reports of the successful use of adrenalin in this affection may, perhaps, be explainable on this basis.

Accepting the general view, that vasomotor nerves are absent from the pulmonary and cerebral vessels, adrenalin would be contraindicated in the treatment of hemorrhages from these parts, because its action in constricting vessels elsewhere would cause an increased flow of blood to these areas and thus aggravate the hemorrhage. The tendency of the blood to collect in those areas which are not supplied with vasomotor nerves following the intravenous use of adrenalin, should be kept in mind, especially if those areas are diseased.

The first and most conspicuous triumph for organotherapy was treatment by thyroid extract. From its great success in myxedema and cretinism, iodothyrin may be regarded as a hormone having a specific action on the central nervous system and on the skin and subcutaneous tissue. The effect of thyroidin on metabolism is to reduce weight, only one-sixth of the loss being due to increased nitrogenous waste, the remainder being due simply to the diuresis it causes, apparently by dehydration of fats.

One of the more recently described hormones[1] still in the experimental stage has been designated hormonal. It is found in the gastric mucosa of all animals thus far examined at the time when the digestive process is at its highest, but it is obtained in sufficient quantity only in the spleen. It is suggested that the gastric mucosa produces this hormone and the spleen stores it up. When injected intravenously or intramuscularly it produces an energetic wave of peristalsis beginning at the pylorus and passing throughout the length of the intestine. Therapeutically it has been recommended in cases of chronic constipation and acute intestinal paresis. Its injection is usually followed by a transitory rise of temperature. It may be distinguished from cathartics in that it causes intestinal peristalsis comparable to the physiologic process and, in those cases which respond, its action is said to be of some permanency or at least of long duration.

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[1] Dohrn, Marxer and Zuelzer, Berliner klinische Wochenschrift, 1908, No. 46.

In general, organotherapy or hormone treatment may be considered in suitable cases to be more specific than drug treatment, in that it inaugurates or maintains conditions very similar, if not identical, with the normal physiologic processes. As drugs have active principles of much therapeutic value, so physiologic research is demonstrating that in hormones, certain, if not all, of the organs of the body have also their active principles which act upon body areas more or less distant, and in a few instances have shown great therapeutic usefulness. With continued research it is probable that our knowledge of the hormones and their use in therapeutics will be greatly extended and the bonds uniting physiology with medicine will be knit still more closely in the future.

DISCUSSION

Dr. Roberts: Dr. Fish's paper is open for discussion.

Dr. Cotton: Did I understand Dr. Fish to say, in regard to the action of adrenalin, that the only virtue was in its stimulating action on the heart in cases of heart failure, due to the action of some toxin in some disease; was that the deduction you made?

Dr. Fish: I did not intend to convey any very extended deduction. But I endeavored to offer a basis of explanation where, in those cases it did seem to work favorably, that the action upon the circulation of the heart was beneficial. Now there may be other actions that we don't know about, but it does have very good physiological action, and where toxin is present and acting on the tone of the heart, it is strengthening, and the circulation may be enabled to throw off these toxins.

Dr. Cotton: It would not be indicated then in the first stages?

Dr. Fish: I would not like to say in regard to that, unless there was beginning evidence of failure of the heart, weakening of the heart and lessening of the tone of circulation. I suppose there is a time of course when that begins, and if the effect is continued long enough, it might be able to counteract that.

Dr. Schlosser: Dr. Fish mentioned the use of adrenalin in intestinal hemorrhage, that it was not beneficial if the adrenalin was given by the mouth. We had a great deal of intestinal hemorrhage in Texas, and I found no benefit at all if given by the mouth. Now an idea occurred to me, and I was going to ask the doctor if the use of cocaine first would not aid the adrenalin in reaching the intestines so there would not be any constriction of the pylorus. I have given the adrenalin in a salt solution subcutaneously, and I did not find any good results from that in intestinal hemorrhage, so I was wondering if adrenalin acted on the veins and vasoconstrictors, and by its action reached the smaller vessels. I have found that eserine would check hemorrhage if given with salt solution, but with the use of adrenalin I have had no success at all. I would like to know if cocaine were used, it might not aid the action of the adrenalin.

Dr. Fish: I cannot reply to that from personal experience, but from a physiological basis it would be reasonable. It might find its way through into the intestine and leave its effects there, and in that case it would be reasonable to assume that the cocaine had preceded it into the intestine. And it might be quicker, as we well know that cocaine and adrenalin are oftentimes given together for renal troubles, with the idea that the vasoconstrictor effect of the adrenalin will bring a neurasthenic effect. That presumably would apply to the action of adrenalin, because it is quicker; so that I should say that if the two, cocaine and adrenalin, were administered together, that the adrenalin apparently produces a quicker effect than the cocaine. The cocaine by being administered first, does produce a relaxing effect upon the muscle fiber, and there may be a chance of its checking an intestinal hemorrhage. I believe in some human cases there have been reports where it has apparently produced some beneficial action in cases of intestinal hemorrhage, but it is recommended more especially in hemorrhage of the stomach.

Dr. Bergman: Dr. Fish speaks of the suddenness in action that you get from the use of adrenalin. I have several times made tracings from the carotid of a dog, after injecting a very small amount of $\frac{1}{25000}$ solution of it into the femoral vein, and inside of, I should say, four or five seconds you get a rise of blood pressure that will force your mercury clear out of the cylinder. And I would like to ask Dr. Fish how he accounts for that very sudden action? It is very quick, you can scarcely inject your solution into the femoral vein when your blood pressure goes up, and I wondered what structures were involved in the action.

Dr. Fish: As far as my own experience goes, it corroborates that of the gentleman who has just spoken. I have taken blood pressure tracings from the carotid of a horse, and found that it acts similarly to that of the dog. It is rather difficult to offer an explanation, it seems to me, except a theoretical one, and that is that the drug will act, I believe, both upon the heart, as well as upon the vasoconstrictor nerves by increasing the action of the heart. That increases the circulation, and that quickens the distribution of the drug throughout the body. But I have sometimes thought that that explanation is hardly sufficient to explain the rapidity with which the pressure rises.

Dr. Roberts: Is there anyone else? Would you care to say anything more along this line, Dr. Fish?

Dr. Fish: I have nothing more.

Dr. Roberts: Then we will pass on to the next paper, "Cannabis," by Dr. Herbert F. Palmer of Philadelphia.

CANNABIS

By Herbert F. Palmer
Philadelphia, Pa.

Cannabis indica, or Indian hemp, is the name under which all of our cannabis of former days was marketed. Cannabis indica is obtained from the plant, Cannabis sativa, a native of Caucasus, Persia and the hilly region of northern India. It is an annual plant from four to eight or more feet in height, with an erect branching angular stem.

The United States Dispensatory says: "The hemp plant of India, from which the drug was formerly derived, has been considered by some as a distinctive species and named Cannabis, indica; but the most observing botanists, upon comparing it with our cultivated plant, have been unable to discover any specific difference. It is now considered a variety and is distinguished by epithet, 'indica.'"

It was H. C. Wood who first used the American plant by taking a parcel of plant from Kentucky, making an alcoholic extract and found it effective in less than one grain. This result was so decisive that, at the 1880 revision of our *Pharmacopœia*, the American plant was recognized; but in 1890 it was dropped as C. americana. Remington, in his *Practice of Pharmacy*, says: "The dried flowering tops of the pistillate plants of Cannabis sativa (Linné), grown in the East Indies and gathered while the fruits are yet undeveloped and carrying the whole of their natural resin." In the native Indian fields, the male plant is removed from the field long before the female plants are gathered, as they considered the unfertilized female plant would produce a greater amount of resin than if both were allowed to grow together. In America no particular attention is paid to this fact. Such Indian cannabis contains a resinous substance—cannabinine, volatile oil and tetano cannabinine. Alcohol is the best solvent for the active principles.

According to Winslow, in his *Materia Medica*, the active principle of Cannabis indica is cannabinol, a red oil or resin boiling at a high temperature. The therapeutic value of the principle has not been sufficiently studied to enable it to be used as a substitute for the crude drug or its preparations.

The fluidextract and a tincture are official. According to Caspari, much of the commercial drug is of poor quality, and it seems desirable to have the fluidextract tested physiologically before it is used.

There are three varieties of Cannabis now used by the veterinarian—the Indica, the African and the American. Each is given the same chemical and physiological assay and as far as can be determined, are made to the same definite standard. Isolated patches of American variety are found in the outskirts of Philadelphia, and some of the commercial article has been grown. Both of these patches gave a plant from which a fluidextract of Cannabis americana was made, which tested high in physiological activity. This nearby supply of the hemp plant enables the great reduction in price of the American over the Persian product.

Charas or churrus, or hashish, as the Arabs call it, is a resinous substance obtained from the yellow glands of the plant. It is secured either by rubbing the flowering tops of the plants in the hands and scraping the resin from the hands or by men clothed in rawhides running through the dwarf plants, securing enough of the resin on the rawhide clothes to collect into a ball, which they call charas. This crude material was formerly employed as an intoxicating agent, but is now excluded from civilized medicine.

Cannabis is assayed both chemically and physiologically. In the physiological assay, 0.2 gram of fluidextract of cannabis per kilo of weight of dog must produce: first, excitability, second, muscular incoördination, followed by lassitude and sleep. The results are shown for several hours.

It has been clearly shown in the laboratory that the physiological assay does not always follow the results of the chemical assay. For instance, the chemical assay will determine the amount of the resin, but the physiological effect does not always follow the percentage of resin.

The following table shows the comparative results of both physiological and chemical assay of the three varieties of cannabis:

Cannabis indica.		Cannabis africana.		Cannabis americana.	
Chemical assay. Resin. Per cent.	Physiological assay. Per cent.	Chemical assay. Resin. Per cent.	Physiological assay. Per cent.	Chemical assay. Resin. Per cent.	Physiological assay. Per cent.
12.2	...	10.6	100.00	6.4	133
12.7	...	16.77	133.33	12.46	100
14.25	100	14.2	133.3	14.09	100
12.81	100	8.6	100.00	12.94	133
13.04	80	10.00	133.00	5.29	100
13.4	66	17.5	Less than	6.55	100
14.00	160	...	20.00	10.78	160
10.38	133	18.79	100.00	...	250
15.07	133	17.78	83.00	...	114
	200	10.71	133.00	17.06	114
	140				

From the observations made on dogs, it was shown that Cannabis africana exerts a more hypnotic effect than Cannabis indica. This conclusion was also borne out with its use on horses at the University of Pennsylvania. We feel positive also that it will be shown that Cannabis americana will be found to possess less deliriant and more of the hypnotic effect than the Cannabis indica.

According to Winslow, in his *Materia Medica*, Indian hemp is a distinct depressant to the functions of the brain and cord in poisonous doses, although small quantities therapeutically stimulate these organs. It produces in man a kind of intoxication and mild delirium. It is not comparable to morphine as an analgesic on account of the uncertainty and slowness of its action and because anesthesia is only produced by an unwarrantably large dose. It is only superior to opium in not causing constipation, anorexia or indigestion.

For this latter reason, veterinarians have often employed cannabis, and profitably so, for the relief of colics of the horse. Many make it the chief anodyne of their colic mixtures. In all such cases it has been used by mouth and very satisfactory results thus obtained.

Such use of the drug is to be commended. There has, however, come a tendency to use this drug in the vein. This has no doubt arisen from the fact that quick action is desired and also from the fact that it was used on "Subs" and no immediate bad results noticed. Dr. E. L. Quitman, at a recent clinic of the Missouri Valley Veterinary Association, said in substance, that the active principle of Cannabis indica depends on a resin, and when resin and water are mixed a gummy precipitate results. This is exactly the same when cannabis and blood are mixed. This resin introduced into the blood stream may not at once form a thrombus and you will likely produce complete anesthesia. You may, however, have a case of obscure lameness in the same horse, to which you gave the cannabis in the vein, occurring days or even months afterward. The cannabis may have formed a thrombus and even at this late date given trouble.

To ascertain what effect the alcohol contained in the fluidextract would have, a series of test dogs was used. The regulation dose of 2 grams per kilo of body weight was given of alcohol by mouth and no appreciable results noticed. However, if an alcoholic equivalent of 0.2 gram per kilo of body weight was given in the vein, the result was similar to the fluidextract of cannabis. Excitability, incoördination and lassitude followed the alcoholic dose in about the same way and lasted about as long as the standard dose of fluidextract of cannabis when given in the vein.

These results were rather startling, so similar work was tried upon a horse, but with far different results. A dose of alcohol equivalent to two or three times that contained in the cannabis was given in the vein. Only slight reaction was noticed and nothing like the excitability, incoördination, and lassitude which was obtained with the cannabis.

However, the proportionate dose of cannabis for the horse is far less than for the dog. In the vein of the horse, action was obtained in doses of about 0.02 gram per kilo of body weight and great variation is also noted upon the individual animal.

These results showed us that the full action obtained by cannabis was not due to the alcohol content. It also showed that the amount of cannabis necessary to produce physiological effect in a horse was much less in proportion to weight than in a dog.

DISCUSSION

Dr. Roberts: Dr. Palmer's paper is open for discussion.

Dr. Barnes: I would like to ask the doctor if he uses the Cannabis indica in the extract, or in combination to get the medicinal effect in colic. He tells us it is used very frequently in the place of opium or laudanum. Do you use it with alcohol to relieve pain, or clear, or do you combine it with some other drug? It is, I am well aware, used at the present time pretty extensively as a substitute to take the place of opium. But it seems to me that in combination with something else, it works still better and you get better results and satisfaction, as the majority of colics are somewhat complicated.

Dr. Palmer: Personally I have used the cannabis as a single drug, using the fluidextract. I know a very great many use it singly, and a great many use it in conjunction with other drugs. For instance, they make up a colic mixture (nearly every doctor has his own colic medicine), and I believe seven, eight or nine out of ten of these colic mixtures have some preparation of cannabis in that mixture.

I imagine that cannabis at the present time is used more in conjunction with some other drug, than it is singly. I believe I am safe in saying that probably more veterinarians use it with other drugs, although my personal experience is, if you want to get the best results from cannabis, you don't want to combine it with other drugs.

Dr. Campbell: I think it might be well to emphasize the statement made by Dr. Palmer that cannabis should not be used intravenously. I know it is used that way by many men regularly, and I think they continue to use it because they do not keep track of their cases. I would like to ask the essayist if he has had any experience with the hypodermic use. We know that cannabis is irritating and that it should not be used hypodermically, but I know many men that are using it. I know a man who stands for giving it hypodermically, and I have known of others doing it. I would like to know if any scientific record has been kept of the results when so used.

Dr. Palmer: Mr. Chairman, I think it is bad enough to use cannabis in the vein, but I think it would be worse to use it hypodermically.

Dr. Roberts: Anyone else? This is quite a revelation to veterinarians. Many of them for the last four or five years have been using large quantities of Cannabis indica intravenously, and I know of some of the bad results that have followed.

Dr. Bergman: Mr. President, I would like to ask the doctor how much fluidextract of Cannabis indica he feels it would be safe to administer to the average horse, how many ounces?

Dr. Palmer: Mr. Chairman, I have not been at work along that line long enough to say what is the correct dose. You hear of veterinarians using one, two, three and four ounces at a time; but I imagine up to a certain point you get the effect, and beyond that you do not get any more. It goes in there as a normal liquid, and no effect is obtained, I imagine, beyond a certain point.

Dr. Bergman: The reason I have asked that is, I have repeatedly used two ounces with very good results. I came through Pennsylvania the other day, and I stopped at the University of Pennsylvania on my way here, and they had administered three ounces of Cannabis indica to a medium-sized horse. I don't know just what time they administered it, probably three hours before, without any noticeable result whatsoever at the time. Of course they might have had an action later on, I don't know.

Dr. Barnes: I would like to ask the gentleman if he means three ounces of fluidextract?

Dr. Bergman: Three ounces of fluidextract; yes, sir.

Dr. Barnes: That is quite a dose.

Dr. Newton: I might say I have used a good deal of fluidextract in my practice, and I think two or three drams is plenty. I think you get just as good action from that as you do from two or three ounces.

Dr. Dunphy: Mr. President, I don't know that I have anything to say along this line from a therapeutic standpoint. I have used fluidextract of Cannabis indica, and Cannabis americana to some extent in cases of colic, and I have always noticed that I have very good results. From three drams to one-half ounce is all I have ever given.

In an experimental way I have given larger doses. I have also given large doses in an experimental way intravenously combined with a normal saline solution, and I cannot see that I have had any serious results, although you can readily understand there is danger at times, or might be danger, of a thrombus, or thrombosis, especially if the fluidextract is not well diluted. Some few years ago a veterinarian called my attention to the fact that he was using Cannabis indica as an anesthetic in performing surgical operations, and he told me of the very nice result that he had from the administration of the fluidextract of Cannabis indica intravenously on a horse that he operated upon. He operated on the horse about half past one in the afternoon, and the animal did not wake up until about five in the afternoon. He was a little nervous over it, as it was the first case, but after this one came out so well, he used it without any apprehension of danger afterward. He informed me that one-half ounce of fluidextract of Cannabis indica administered intravenously would always produce anesthesia.

Well I tried it one day in an experimental way on a horse that I didn't care very much about, and we gave him one-half ounce. No result. We followed it up some fifty minutes later with an ounce, and no results. Well, our time was taken up the rest of the afternoon, and we began afresh the next morning with an ounce and a half. No results.

Two ounces were given, and we noticed a little unsteadiness of his gait. I made up my mind then that it was a very uncertain anesthetic. Some few weeks afterward I was not satisfied with those experiments, and I thought I would try it out again. I did, and I found very good results on a horse by giving six drams intravenously. I would not recommend, and I would not feel like recommending, the use of Cannabis indica as an anesthetic. It would be too slow in its action, and too uncertain. While some animals will yield to a very small amount, others seem to tolerate an unlimited amount.

Dr. Roberts: Dr. Fish, have you anything to say?

Dr. Fish: I think not.

Dr. Roberts: Is there anyone else? I have tried Cannabis indica in some surgical cases, and had them die very suddenly three weeks afterward. I don't like it as an anesthetic in surgical cases.

Dr. Palmer: There are just two points I want to bring out in the discussion, and one is the individuality. You will be surprised at the difference in the action of cannabis upon different individuals. When you go to give cannabis to animals of the same weight and of the same type, and apparently in the same condition, you find a great difference in the individuality in the action on horses. Those who do physiological work, tell me that in testing upon dogs, they once got hold of a dog that they experimentally gave cannabis to; it had its effect but he came out of it, and they used that same dog over and over again. He would go up and get his drink, and twenty-four or forty-eight hours afterward he would go up and get his drink over again, and they got far better results by using the same dog time and time again and letting him get over the action, than they did by using the same preparation and watching its action upon different dogs. That, I believe, is the experience of all physiological testers.

So there is the individual action, as Dr. Dunphy has spoken of. One horse received an ounce and a half and hardly showed the result after he had several doses, and perhaps the next horse would show very marked results on an ounce and a half. So don't go to giving each one of your patients an ounce or an ounce and a half of Cannabis indica with the expectation that you will get anesthesia, for you may and you may not.

DR. BERGMAN: In these two experiments I would like to ask the doctor if, in case of the two doses given, he used the same fluidextract, used the same preparation out of the same bottle.

DR. DUNPHY: It was used out of the same bottle, and the very same preparation. The whole preparation was in a pint bottle. So I think myself it is the peculiar disposition some horses have in regard to the immediate effect of the drug.

DR. ROBERTS: We will pass to the next paper. Dr. Jensen, of Kansas City, has asked that his paper be read by title, and his request is granted. It is "Veterinary Posology as Governed by Absorption and Elimination."

VETERINARY POSOLOGY AS GOVERNED BY ABSORPTION AND ELIMINATION OF MEDICINES

By H. Jensen
Kansas City, Mo.

The posology of veterinary medicine is in a state of chaos, every writer on the subject seeming to adhere to his individual ideas, while students of veterinary medicine follow the idea of their respective instructors. Text-books tell us that so much is the dose, usually giving the minimum and maximum doses, but the question so often asked in the class-room, "How often should this dose be repeated?" has seemingly been lost sight of by the writers of veterinary pharmacology. From personal observation for a number of years, I know that the time of absorption and elimination of medicines, which, after all, governs the problem of how often to repeat the dose, is an unknown factor to a great many practitioners.

The question of the amount of a remedy to be given within twenty-four hours has been decided in a sort of off-hand manner, often with fatal results. The principles underlying absorption from the intestinal canal are fairly well understood, but it may not be out of place to recall factors that facilitate and retard absorption. Before any substance enters the circulation, it must be in solution and the nearer we have medicines approach the liquid state, the quicker they will have effect and the smaller will be the dose required. Thus fluidextracts and tinctures or alcoholic solutions in general are more rapidly absorbed than powders or boluses. The state of the stomach also influences absorption. Medicines given on an empty stomach enter the circulation much more rapidly and produce better local results; whereas medicines given on a full stomach lessen the rapidity of absorption, but also permit of larger dosage by causing extensive dilution of the medical agents, thus rendering irritating chemical substances less injurious. The condition of the stomach, whether active or sluggish, must also be considered, as under certain conditions the stomach will not assimilate medicines at all, when medication through other channels must be resorted to. All crystalloids in solution are rapidly absorbed; colloids, like albumin, fats, gums and resins, must be digested and emulsified before they can be absorbed. The factors governing elimination are not so well understood, but it is generally accepted that slowly eliminated agents form firmer compounds in the body and are slowly dissociated. Elimination may also be suddenly arrested by drugs causing constriction of renal vessels, when the system has become saturated, *e. g.*, digitalis and strychnine.

The question of how often the prescribed dose of medicine may be repeated depends then entirely on the following factors: (1) how rapidly it is absorbed; (2) how rapidly eliminated; (3) state of stomach; (4) character of drug given. This of course requires knowledge as to the absorption and elimination of each drug, and without this knowledge on the part of the practitioner, the above question cannot be settled. It can be readily understood that a drug that is slowly absorbed cannot be relied upon for immediate action, neither can a drug be safely repeated in maximum doses very often when it is slowly eliminated. To make these points clearer, I have selected a number of representative drugs, in daily use, by veterinarians, for consideration.

Aconite is rapidly absorbed and partly destroyed in the body by oxidation; the remainder is eliminated through the kidneys, the effect from ordinary medicinal doses not lasting over three hours. The softening and slowing of the pulse, with moisture on the skin, is the best indicator that the patient is under the influence of the drug, and the dose should be diminished or given less frequently. I estimate the maximum amount of fluidextract of aconite that may be given in twenty-four hours as three fluidrams, except in the extraordinary condition of a full, bounding pulse, with high arterial pressure, when more may be given.

Belladonna is very rapidly absorbed. Dilatation of the pupil may be observed twenty minutes after its administration by the mouth. It is very rapidly eliminated through the kidneys, bowels and mammæ, hence poisoning by belladonna is rare. The amount necessary for twenty-four hours medication should not exceed six fluidrams. As an anodyne or antispasmodic, one or two large doses are indicated. In febrile disturbances, to equalize the circulation, small doses often repeated are indicated.

Digitalis is slowly absorbed and slowly eliminated. It is called a cumulative poison. From this statement it is clear that digitalis cannot be relied upon for immediate effect as it takes over two hours after its administration before the action on the heart is noticeable. Owing to its slow elimination, its effect is prolonged, hence the dose should not be repeated oftener than four times in twenty-four hours. Owing to a further fact that this drug increases the susceptibility of patients, the dose should be minimized in cases where its constant use is indicated, or discontinued for a few days, substituting agents having a similar action. For a period of twenty-four hours or when it is not to be used for any length of time, as much as 3 drams of the fluidextract may be used. In conditions that call for its continued use, from 1½ to 2 drams of the fluidextract should suffice.

Strychnine is rapidly absorbed. In small doses it is nearly all oxidized within the body. When large amounts are given, a portion is eliminated through the kidneys as strychnine and strychnos acid may be found in the urine several days after the administration of the last dose. Older writers classify this as a cumulative poison. The horse is not very susceptible to it, 1½ grains having been given hourly for three days without fatal results. The dog is very susceptible to strychnine. In dog practice not more than $\frac{1}{40}$ grain should be given in twenty-four hours. Cows, in a high state of nervous excitement, are very susceptible to poisoning from strychnine.

The iodides also furnish very interesting material for study. They are very rapidly absorbed and disseminated through the system. The saliva will respond to the starch test for iodine ten minutes after ingestion. They are, however, slowly eliminated, and as a result thereof, iodism will soon manifest itself when full doses are given. When these symptoms occur, the drug should at once be discontinued for several days. Ordinarily 2 to 4 drams of the iodide, depending upon the case, should be sufficient for twenty-four hours' treatment. Cattle are especially susceptible to the iodides.

Salicylic acid and sodium salicylate are very readily absorbed and while the elimination begins early, it is slow and prolonged; therefore large doses often repeated produce toxic symptoms; not more than three ounces should be given to a horse in twenty-four hours.

Spirit of nitroglycerin is one of our valuable therapeutic agents, its chief action being that of a powerful vasodilator. Its effect lasts only a few minutes.

Ammonia given by inhalation as a general stimulant is very evanescent in action, hence should be reinforced with agents like strychnine or caffein.

Adrenalin chloride given intravenously is prompt in action and efficient, but of very short duration, not lasting over fifteen minutes. Given hypodermically or applied locally, it constricts the arterioles and absorption is comparatively slow and unsatisfactory. This is a most valuable agent in cases of greatly reduced blood pressure and as a vasoconstrictor and heart stimulant. Given by mouth to overcome intestinal hemorrhage, it should be repeated every two hours.

Arsenic is quite rapidly absorbed but very slowly eliminated. Professor Paulson states in support of slow elimination that in a case of arsenical poisoning, arsenic was found in the urine two months later. It is also a well known fact that in cases where arsenic has caused death it may be found in bone years afterward. It follows that one daily dose of one ounce of Fowler's solution, when the constitutional effect is desired, would be the proper amount and mode of administration. If the stomachic action is desired, two-grain doses of arsenic trioxide three times a day would be the better way.

A great many other drugs may be mentioned in this connection, but inasmuch as this paper is only intended to stimulate an interest in this particular phase of therapeutics, those mentioned will no doubt serve the purpose. In conclusion I wish to remind you of the following factors which should govern us in determining the proper dose, and framing directions for administration, viz., age, weight, sex, condition physically, does the condition require continual treatment or is the case acute or chronic and character of drug given as to absorption and elimination.

Dr. Roberts: Dr. H. D. Bergman of Ames, Iowa, will read the next paper on "The Atropine Series."

Dr. Bergman: Mr. Chairman and Gentlemen: I would like to make a little explanation in regard to the subject of my paper which force of circumstances has obliged me to change. When Dr. Glover last spring asked me to prepare a paper for this meeting, I had in mind at that time the particular line of experimental work that I was going to conduct with the atropine series, particularly hyoscyamin and others of the atropine series, and I intended to commence this work about the first of June. During the season when it was time for the paper to be prepared I was very busy, for this summer we have had the worst attack in Iowa of hog cholera that we have ever had. Out of our ten million hog population, probably one million are affected, and probably four or five million will be vaccinated. The last session of the Legislature gave us an appropriation for the conduct and maintenance of a serum laboratory at Ames under the direction of the veterinary division, and in getting that work started it has been a rush to save the hogs, no matter what our particular line of work happened to be. I have volunteered with the rest, and been making hog cholera experiments since the last of June up to about a week ago. And I have taken a subject I have thought considerably over which I will present, entitling it, "Therapeutic Fallacies." It is somewhat general, but I believe there are some good points.

THERAPEUTIC FALLACIES

By H. D. Bergman
Ames, Ia.

Of what value are medical organizations? Why do we as veterinarians hold our state, interstate and national meetings from year to year? Are these meetings an absolute necessity for the upbuilding of our profession? Your answer comes at once and rightly: why most assuredly, it would be impossible for our profession to prosper without organizations of this kind.

Primarily, it may be said that we organize for the purpose of elevating and maintaining the ethical standards of our profession, and also by the fact of a determination to make our profession more efficient and valuable to our respective communities by the advancement and diffusion of knowledge among our members. Consider for a moment how the great mass of professional knowledge to which we have access has come to exist. Has it been worked out by any one or half a dozen members of the profession? Take for instance all the original discoveries of the most proficient half a dozen men of our profession or any other, and consider how utterly insignificant those facts would be as a basis for the practice of veterinary medicine. Hence it is plain to be seen that it has been entirely through the communication to his fellows of some new fact or method discovered by a certain individual, that our great mass of professional and technical knowledge has come to exist, and, without a diffusion of professional knowledge in this way no medical profession could exist.

Also, the necessity of professional organization to maintain and enforce a standard of professional ethics is well understood. Again, with an organized profession we are able through consultation and coöperation, to decide and fix the value of such new scientific methods, tests, etc., as directly concern us and which are being presented from time to time for our approval. However, along with the more general advantages which are offered by a permanent organization there is also that important advantage of having an organized strength to cope with such problems as may arise from time to time, and which may be of vital importance to the profession as a whole. It is in regard to just one of these problems that I wish to speak, and to which I will apply the term "Commercialized Therapeutics."

It is my opinion that the same crisis is approaching in veterinary medicine which has already arrived in human medicine, and with which we must be prepared to give battle in the same manner as has our sister profession. I am speaking now of the increasing number of veterinary proprietaries and nostrums with which the market is being flooded, and also the growing tendency of the practitioner to allow some personage, probably not a veterinarian, to sit in his office in the city, and formulate his prescriptions, govern his dosage, in fact to treat his cases, a condition which is becoming detrimental to exact therapeutic progress. Take, for example, our greatly lauded active principle medication, the rational use of which is certainly to be commended. Yet, there is no question of doubt, but that there are so-called active principles being constantly advertised and dispensed which are absolutely inert as far as any therapeutic value is concerned, and are interesting, as Dr. Hatcher says, in regard to cactin of Cactus grandifloris, one of the constituents of our well-known H. M. C. tablets "only in the fact that they are absolutely worthless." Another point to be taken into consideration in the use of active principles is the inconsistency or lack of uniformity of action derived with a great many of them.

Getting away from active principles, take echinacea for instance. It has now been over two years since the Council of Pharmacy and Chemistry of the American Medical Association made a complete study of this drug from all standpoints, and the eminent Henry Kraemer announced through his *American Journal of Pharmacy* that echinacea had been thoroughly investigated and had been deemed worthless and unworthy of further consideration as a medicinal agent until more reliable evidence had been presented in its favor. Yet this drug is being advertised and sold to the profession today at a very high price. Look at certain of our own medical journals. They are filled with so-called cures for various and sundry diseases. We find not only the advertisements but also reading notices from members of our profession as to the wonderful results derived from these remedies. A few of our veterinary proprietary, patent, and fixed formulæ preparations I admit have a distinct value, representing original work, and are worthy of recognition as therapeutic agents. The vast majority, however, are but simple mixtures or are well-known drugs put out under fanciful names with no advantages whatever over pharmacopœial drugs or national formulary preparations. Glance over a few of the circulars which arrive in your mail by the armful, without even mentioning biological products; look at the shot-gun colic remedies, azoturia cures, cures for moon-blindness, hog cholera, antidiarrheal, anti-constipation, worm-remover compounds, and such combinations as heart stimulant No. 1 and heart stimulant No. 2. Verily it reminds one of the days of the ancients when a medical prescription was the same for all disorders and consisted of some four hundred ingredients. There is no question but that the use of proprietaries, so-called specifics, favorite prescriptions and fixed formulæ preparations of commercial concerns is increasing, and by many veterinarians has almost displaced the use of the individual official drug.

You may ask at this time what are the objections to the continued use of preparations of this kind. First, their use is in direct opposition to the principles on which true medicine and true pharmacy are based, and if continued has a tendency to check advance in scientific methods of treatments, as well as inhibiting intelligent clinical observation. Again, no dependence can be placed on the constancy of action of such substances, and hence no certain comparisons can be made from observations on their actions. I believe, also, that their use has a tendency toward the irrational practice of medicine. The statement has been made by an eminent medical writer that the unscientific, not to say irrational tendency, toward the practice of medicine which seems to be overtaking the professions, is fostered if not engendered by the vast number of nostrums advertised in the various journals and forced on the attention of the profession daily by those who make their living and the fortunes of their employers out of our credulity.

Let us enumerate some of the reasons for the increased use of these preparations by the profession and also endeavor to note where may be the relief. The newspapers and farm journals are denounced, and rightly so, as one of the chief agencies responsible for the dumping of worthless veterinary nostrums and proprietaries upon the public. Upon these, however, cannot be laid the blame for the use of these things by the veterinarian himself. We must revert to our own medical journals, veterinary organizations, veterinary schools and to the veterinarian individually to search out both the cause and relief. Personal investigation among veterinarians has shown the following reasons for the use of favorite and fixed prescriptions, so-called specifics, special formulæ preparations, proprietaries, etc., instead of prescribing and using official drugs or pharmacopœial or national formulary preparations according to indications and at a great saving of expense:

1. Inability of their respective pharmacists to provide such drugs or preparations as they might need. Here, of course, is opportunity for coöperation between pharmacist and veterinarian, as well as our respective organizations. However, if allowed to venture an opinion, I would say that it was lack of opportunity for the sale of rather than lack of desire to equip himself with such drugs that prevented the pharmacist from being able to supply the veterinarian.

2. The excuse that it is easier to prescribe and use the commercial preparations has been offered. This, of course, we must brand as indifference and laziness and pass it by.

3. The continued campaign that is waged by our journals and the various commercial houses and their agents is offered as an excuse. If our own medical journals are at fault, then it is time that our organizations demand that they choose carefully their advertising. As to the various commercial firms, etc., the time will come, and has come to some extent, when more national legislation, such as the Pure Food and Drugs Act of June, 1906, will assist in protection, but there never has been and never will be enacted laws which will protect people from the consequences of their own folly; for instance, the law will not prevent the sale of inert or harmless drugs or preparations providing the public wishes to buy them. The Council on Pharmacy and Chemistry of the American Medical Association has been of vast usefulness to our profession in the publication of their investigations and findings, but cannot we at least plan for something of that kind in connection with our own organization in the near future, to assist us more directly in separating from the chaff an occasional grain of usefulness?

4. Another reason given by practically every veterinarian whom I have approached in regard to the use of commerical

preparations, etc., is his limited knowledge of pharmaceutical methods, materia medica and therapeutics, and his lack of knowledge of incompatibilities and prescription writing. The statement is made by an eminent M.D., that there are very few medical schools from which a man will go, diploma in hand, carrying away with him an adequate practice and knowledge of prescription writing, the schools omitting, he says, to teach the art of medicine along with the so-called science. So, the veterinary schools are not alone in their lack of thoroughness in this respect. If we of the schools, are responsible in a way for this menace which is confronting us as a profession, then it is high time we were looking to our standards, courses and methods and rectifiying them to the extent that we may be held blameless.

In closing, I wish to say that we are confronted by a problem which will not solve itself. It is going to take some thought, time and effort, both by organizations and individuals, to solve it. Our success as a profession depends to a large extent upon our accuracy of diagnosis and our therapeutic methods. The choice of medicinal agents, following diagnosis, is by no means simple, for here probably hangs the professional success of the practitioner. Lastly, the most reliable medicinal agents the market affords are none too good for veterinary practice. For through the use of unstandardized preparations, proprietaries, nostrums, and preparations of indefinite potency otherwise skilful treatment often fails.

DISCUSSION

Dr. McInnes: I just got in but I want to say that I endorse every word Dr. Bergman said about nostrums and patent medicine that so many veterinarians use. They come to me every now and then and want to sell me medicine, and I tell them they must think I am a very curious veterinarian. They tell me, "I have just sold so-and-so hundreds of dollars of those medicines," and I say, "You can't sell me any." I have always kept my own little drug store. I don't write prescriptions at all. I find it better to give away my medicine than to write prescriptions. I have been in Charleston, S. C., about thirty-nine years, and I have never written a prescription yet. I was brought up in a little pharmacy in Scotland, and I make up my own medicines and carry them, and I had rather give away medicines than write prescriptions. And as for these patent nostrums, I think a man is a fool to buy all this sort of thing. There are dozens of things in them that are absolutely no good.

Dr. Palmer: Mr. Chairman, as a member of a commercial house, I feel I have something to say on the other side of this question. Unfortunately this man rang in a paper on us outside of the announced subject, on a different title, and has given a harangue upon commercial houses in general, and I am here with my voice to defend that part of the business. When you make a statement that you cannot depend upon these preparations, as the statement was made in the paper, he is placing all classes of commercial people in the same line, the man that is making his little dope and selling it to patent medicine men around the country, and the commercial house that spends thousands and hundreds of thousands for perfecting certain classes of drugs. I would like to take those that are here in this hall today through some of the work that a commercial house does, and see some of the medicine that is thrown away at great expense, although it could be sold under the names of certain preparations; and when you place houses like these under the unreliable class, we are here to defend them. When you put a label upon a bottle of the U. S. P. fluidextract, for instance, you have a come-back if it is not a good fluidextract; and if he who is using that drug prefers to buy and use an inferior grade, it is his own fault, because when the better preparation is put up, and the label of the better preparation is put on that bottle, it means something to you and Uncle Sam to be put out according to the label on the bottle, and this includes biological products, which, if you have come into intimate relation with that law, you know are also under supervision. It deals not only with the common biological products, but with many of the preparations of which the veterinarian of today is asked to use, and it will tell if that preparation is not up to the standard, which is an open standard not a secret formula. That which is approved is not a patent medicine nostrum, but it is the article of the man whose formula is placed upon the bottle, just as John Jones can make it for any commercial house, and there is no secret about it. Why does a veterinarian buy these preparations? I say in the first place because the commercial house can put them up in quantities at a much cheaper rate than the individual can put them up, and at the same time be sure of having a standard product. The individual veterinarian writes his prescription, that goes to the drug store, and is or is not filled in the right way, and he has a mixture. He can go to the commercial house and can buy that mixture already prepared for him, and he can read on the label just what he is buying. He does not have to buy a certain colic mixture that he doesn't like. There are other colic mixtures, there are other things he can buy. And when the majority of veterinarians are using a certain preparation along a certain line for a certain disease, there comes a demand through the commercial houses to put that preparation up, and the commercial house puts it up, and the veterinarian is assured by the formula and the name of the house of what there is in that preparation, and the amount of goods that is in its make-up.

Dr. Bergman: Mr. Chairman, I did not like exactly what Dr. Palmer said in regard to the ringing in of the paper. I thought I stated specifically enough why I changed the subject of my paper. As far as that is concerned I would just as soon publish it a year in advance.

Now I dealt in generalities rather than individualities; however, I would just as soon have dealt in individualities if I deemed it proper at this time.

In regard to the U. S. P. preparations which he mentioned, I believe I mentioned something in regard to their use, and as being, as a rule, absolutely O. K. I believe that I also made note of the fact that certain of these commercial products of various kinds had been isolated at considerable expense, and were worthy of consideration by the profession; there is no doubt about it. I was merely taking into consideration and mentioning a few. I did not mention many, but I could mention more that are not worthy of consideration. I appreciate the fact that the commercial houses have done a great deal toward the advancement and uplifting of the veterinary profession, as far as that is concerned; and yet there is no question or doubt but what there are preparations being sold and advertised today which are not any good, and are worthless.

Dr. Campbell: This is the second time within a year that I have heard the subject matter discussed by the essayist brought up in a veterinary convention, and the manufacturing chemists who are supplying the veterinary profession with the therapeutic tools which make veterinary practice possible criticised in what appeared to me to be an unjust manner. On the former occasion I let the matter pass without comment, but with this repetition of it I believe it well to call the attention of the essayist, and any others who may think as he does, to a few matters which they have without doubt entirely overlooked.

The essayist is, I believe, largely in error when he speaks of the wide use of nostrums by the veterinary profession. By nostrum I understand a preparation the ingredients in which are kept secret by the manufacturer. This at least is the general understanding of the term nostrum, and is I presume what the essayist had in mind. So far as I know, and my opportunity for information on this subject has been better than the average, nostrums are but little used by practising veterinarians.

In the same breath with which the essayist speaks of the use of nostrums he censures pharmaceutical houses generally. This more clearly demonstrates his error, for there is not to be found any nostrum or secret remedy, on the list of products of any of the six largest pharmaceutical houses in this country, which manufacture products for veterinary use. Again, the essayist speaks of the folly of a man, oftentimes not a veterinarian, sitting at his desk in the city and writing formulæ for the use of practising veterinarians. This accusation is scarcely just. All the large pharmaceutical houses, which cater to veterinary trade have veterinarians on their staff and it hardly stands to reason that these houses would go to the expense of employing veterinarians and then not require them to get up the formulæ for their veterinary preparations. I do not think this point requires argument.

The essayist seems to question the ability, or the integrity or perhaps both, of the veterinarians who are engaged in commercial work and have a part in supplying preparations for veterinary use of (to him) questionable value. As to their ability, I can say only this: The salary paid for work of this nature is better than that paid to veterinarians in most other lines of endeavor in this country. The managers of these pharmaceutical houses are shrewd men of recognized business ability, having the money to pay for ability in this line and being disposed to use it for this purpose it is only reasonable to suppose that they secure veterinarians with a fair measure of professional ability. As to their integrity, that is of first importance to the house that employs them and I am sure we can leave it to them. Their own interest and even self-preservation of these houses demand absolute honesty of all their essential employees.

There is another side to the charges which the essayist makes. He speaks of so-called active principles that are without therapeutic action, and mentions some of the most commonly used drugs. Now this reflects seriously upon the intelligence of the practising veterinarian. What excuse can there be for the man who day after day and month after month pays out good money for a drug from which he can get no therapeutic action. I do not believe that practising veterinarians can be "buncoed" to this extent. In this connection cactin was mentioned and the experiments of Hatcher of Johns Hopkins University. I am quite familiar with the experiments to which he refers. They were made on a normal dog to ascertain the effects of cactin on a normal heart and his conclusion was that it has no effect under these conditions. This has recently been disputed by some equally careful experiments carried on in a European laboratory, but in any case it is wholly beside the question. I do not know of any firm selling cactin, which at any place in any of their promotional literature attributes to that drug an effect on a normal heart. Their claim is that it affects irregular heart action, and hundreds of tracings of blood pressure have been made which seem to substantiate this claim. More important still, millions of doses of this drug have been used by the medical and veterinary profession of this country and the weight of clinical experience is all on the side of those who claim the cactin has a great influence upon what we may call a "nervous" heart. That is, where there is no organic derangement but only a lowered or accelerated, or an irregular action of a neurogenous origin, cactin has a very marked "steadying" influence, a tendency to bring the heart action to normal.

Another thing that contributes to the sale of the preparations of pharmaceutical houses is their elegance and their inexpensiveness. I have seen anti-hog-cholera serum sent out from a state laboratory in a half-filled bottle, evidently a used bottle that had been picked up about the laboratory, and bearing a label written in lead pencil. Now the quality of this serum was undoubtedly first class, but most veterinarians want the pharmaceutical, which they use to reach them in neater packages. Several of the agricultural experiment station laboratories make autogenous bacterins for veterinarians in their states. These bacterins are nearly always sent out with typewritten labels or even labels written with pen and ink. This does not affect their quality of course, but it does lower their presentability.

The same superior appearance and low cost obtain in the case of pharmaceuticals. The manufacturing chemist, with his thousands of dollars' worth of equipment and expert workmen, can put out a fluidextract, ointment, tablet or pill vastly superior in appearance to similar products prepared in an ordinary pharmacy and at a lower cost.

I am not making a plea for polypharmacy and certainly am offering no defence for the exploitation of worthless or inert preparations, but I do believe with a conviction that amounts to a positive knowledge that the pharmaceutical houses are meeting the demands of the present day to the very best of their ability, that they are giving the practising veterinarians the best service of which they are capable and that the adverse criticism of the essayist is in no way merited by our leading houses.

Dr. Rogers: The gentleman a little while ago mentioned the pharmacopœia. It may be news to some of you that the bulk of the work that is done to take preparations out of the pharmacopœia, or the bulk of the work done to put preparations into the pharmacopœia, is done today by the commercial houses, and it is done today by the commercial houses for the reason that they are the only people who are equipped to do it. Furthermore, the pharmacopœia is usually about the period of its decennial revision behind the progress of pharmacy. The pharmacopœia represents the solidified and the crystallized knowledge of the period when it is issued; and when the decennial revision of the pharmacopœia comes out it is always a number of years behind the progress of physiological therapeutics; so that while it is a very good standard in some respects, and a very bad standard in other respects, it is not at all pharmacopœial, far from it. For example, there has been lately, among the medical profession, a good deal of pressure brought to take such preparations as paregoric, Brown mixture and other mixtures out of the pharmacopœia. For what reason? Because they are compound prescriptions; because some medical men think they are shot-gun prescriptions; because another medical man thinks when a man prescribes he should not prescribe more than two ingredients. Now whenever you find a remedy that has borne the dust of ages, you may be perfectly satisfied there is something in it. And the efforts today are to make the pharmacopœia an absolute standard of what shall or shall not be used, as I take it to mean to anyone who is familiar with the trend of modern therapeutics. The pharmacopœia is a very good thing, you have got to have a standard for the standard preparations, but it is five or six years behind what we know.

Dr. Roberts: Has anyone else anything to say along this line?

Dr. Cotton: I came in here too late to hear the paper read, but I did hear some of the discussion, and I am led to believe perhaps both sides are right in this matter somewhat. I have no question about it, and I personally cannot help but feel that we, as a profession, as active practitioners, have become something of a mark for these various biological houses. I know it has cost me a good deal of money the last four or five years since these biological products have been put up for serums and toxins, etc. It has become a serious question in this profession, as well as in the medical profession, and it does seem to me that even our biological houses did put things out with a mark on claiming things they could not substantiate, and which did not bear out its statement, so much so that the American Medical Association at its last meeting delegated a committee to investigate some of these products. And if you should see the deductions or the reports of this committee on these various vaccines, it would bear out this statement that I have made, that we practitioners have been made the victims of the schemes of various biological houses. There is no question but what there is virtue in the serums, etc., and I hope, since the United States Government is going to investigate especially these biological products, that this condition will be improved.

Dr. Barnes: I think the essayist wished to convey the idea that the general practitioner ought to be careful, or to be cautious; that we ought not to grab onto the first patent medicine nostrum that comes along, or everyone that comes along. But I do not think he meant to condemn any reliable standard pharmaceutical or medicine house.

I know, for instance, of a case of a veterinarian writing a prescription, and the party that he wrote it for came back about two years afterward and wanted to renew the prescription, saying that he had lost it. He had been using it for two years, and he would like to have it renewed, and thought it was all right. It was not for the particular benefit of the veterinarian, and that is what this gentleman, I think, wished to convey—that the veterinarian ought to be careful with whom he is dealing.

Dr. Roberts: Anything further along this line? If not, Doctor Bergman, would you like to close the discussion?

Dr. Bergman: I don't think I have anything further to say. I merely made my statements intending them to be general. I did not intend to oppose anyone in particular, and this gentleman here (Dr. Barnes) is about right in what he says of the idea I thought to convey. The gentleman over there (Dr. Cotton) voiced my sentiments exactly.

Dr. Roberts: We will pass on to the next paper by Dr. Louis A. Klein, of Philadelphia, "Therapeutics of Mastitis in Cattle."

Dr. Klein: Mr. Chairman and Gentlemen: The title of the paper that I am down for on the program is, "Therapeutics of Mastitis;" but when I came to consider that subject, I found that it would be impossible to have it presented within the limits of a paper of reasonable length, and so I decided to confine my paper to a consideration of "Therapeutics of Parenchymatous Mastitis." I chose that form because it is the most common form with which the practitioner has to deal.

THERAPEUTICS OF PARENCHYMATOUS MASTITIS

By Louis A. Klein
Philadelphia, Pa.

The pathological alterations of parenchymatous mastitis show a striking similarity to those of pneumonia. There is an exudation of blood serum and an immigration of leukocytes and wandering connective-tissue cells into the acini and ducts of the gland which are accompanied by an exfoliation of the epithelial cells lining the acini and ducts. There is also an inflammatory exudate into the interstitial and subcutaneous connective tissue, which is sometimes very pronounced. If these exudates can be removed and the epithelium is capable of regeneration, resolution occurs. If the exudates are not removed and the circulation is not restored to normal within a certain period, the inflammatory process in the interstitial tissue assumes a productive character. An increase of the interstitial connective tissue occurs and the udder becomes indurated. Subsequently, the newly formed connective tissue contracts and produces atrophy. The epithelial cells disappear in such cases, either as a result of the pressure from the contracting connective tissue or because of extensive destruction at the beginning of the disease. If the milk ducts or canals are obstructed by clumps of casein or fibrin, the pathological secretion will be dammed up and abscesses will form. If the circulation is cut off from a section of the inflamed area by thrombosis or by pressure from the inflammatory exudate or collections of pus, necrosis or gangrene will occur. The necrosed area is subsequently separated from the healthy tissue by suppuration and may then become encapsulated or, as occurs more frequently, the line of demarcation may extend to the surface, when the sequestrum may be eliminated spontaneously or removed by operation.

Resolution and the avoidance of complications, it will be seen depend upon the prompt removal of the exudates. The exudate in the acini, ducts and cistern can be drawn off by milking, but that in the interstitial tissues must be resorbed.

Resorption is a complex physiological process which cannot be generated by artificial means, but the natural processes concerned can be stimulated or increased in capacity by certain therapeutic methods. The principal factors concerned in resorption are the interchange of fluids between the blood and tissues, the leukocytes, and the quantity of blood flowing through the part. By utilizing these natural forces resorption can be promoted.

Purgatives and diuretics increase the interchange of fluids between the blood and tissues. By causing a reduction in the fluid of the blood they cause fluid to be absorbed from the tissues. This is known as the derivative or revulsive method. Sialagogues and diaphoretics also produce a derivative effect. The most striking illustration of the effectiveness of this method is the result obtained from the use subcutaneously of arecoline, a purgative and sialagogue, in the treatment of laminitis in horses. In parenchymatous mastitis, it is customary to use magnesium sulphate as a purgative, but eserine and pilocarpine combined act more promptly and perhaps more thoroughly and effectively, since they are sialagogues as well as purgatives, although their cost may prohibit their use in some cases. Arecoline is not recommended for cattle. On account of their weakening effects, purgatives cannot be repeated but the derivative action can be continued by the use of diuretics. Potassium nitrate is a very popular diuretic in the treatment of parenchymatous mastitis but one of the less irritant saline diuretics would be more desirable. Phytolacca, which has been used empirically in the treatment of mastitis for a long time, has a diuretic action and no doubt exerts its effects in this way. Diaphoretics are of no practical value as derivatives in cattle practice.

Leukocytes assist in resorption by phagocytosis and by causing the disintegration and solution of solid exudates by means of a ferment. Leukocytosis may be increased by the local application of stimulants, such as tincture of iodine, spirits of camphor, oil of turpentine, etc., and by other measures which increase the flow of blood to the part, as hot water bathing, vapor baths, Priessnitz dressing, poultices, plasters, frequent milking and massage. According to Hess, massage should only be used after the inflammation has begun to subside and pain has disappeared. If it is applied at the height of the inflammatory process the disease will be extended to the adjoining quarter on the same side or on the opposite side and the secondary infection is usually more severe and more difficult to heal than the original process.

Massage is also contraindicated when suppuration or necrosis is present. The phagocytic function of the leukocytes can be stimulated by the injection of bacterins, which also produce other anti-bodies, but this action is a specific one and the bacterin is only effective for the particular species of organisms used in its preparation. Since parenchymatous mastitis is a polybacterial disease the preparation or selection of a suitable bacterin for each case would involve considerable detail work. Schmidt, of Kolding, Denmark, the discoverer of the successful modern treatment for milk fever, recommends as a substitute for bacterins the infusion into the udder of equal parts of absolute alcohol and glycerin. This mixture, he says, will kill and dissolve numbers of the bacteria concerned in the disease and when these dissolved substances are absorbed specific opsonins will be produced which will stimulate the phagocytic action of the leukocytes against the bacteria remaining in the udder. But the mixture has a destructive action upon the epithelium of the udder and for this reason can only be used in those severe cases where the life of the animal is threatened or where there is no prospect of the return of the milk secretion. In other cases, the mixture is diluted with an equal amount of physiological salt solution. Usually about 250 c.c. are infused into the infected quarter and the quarter is not milked out for three days. The disintegrating and solvent action of the leukocytes on solid exudates cannot be directly affected by drugs, but a similar action can be obtained with potassium iodide, which destroys pathological cells and causes them to degenerate, and by sodium chloride, sodium bicarbonate, sodium sulphate and ammonium chloride, which dissolve and liquefy solid inflammatory products.

An increased flow of blood through the part may be brought about by heart stimulants, local stimulant applications, hot water bathing, vapor baths, Priessnitz dressing, plasters. poultices, massage and frequent milking. Caffeine will serve the purpose of both a heart stimulant and diuretic and may be given in the form of the alkaloid or strong coffee. Frequent milking, every one or two hours, is a very important method of treatment. The manipulation of the teat dilates reflexly the bloodvessels of the udder and causes a greatly increased amount of blood to flow through the udder. It also removes the exudate and prevents its decomposition and the formation of irritant bacterial products in the acini and ducts of the udder. A suspensory bandage promotes the circulation in the udder and also reduces pain by relieving tension upon the tissues.

When it was demonstrated in the last quarter of the nineteenth century that bacteria were the direct cause of mastitis, Franck advocated that the disease be treated by destroying the bacteria concerned by the injection of antiseptics into the udder. This method of treatment was adopted by many veterinarians, but the results were disappointing. It was found that the antiseptic solutions irritate the udder tissue and frequently increase the inflammation, even when diluted to a point where their effectiveness seems doubtful. Subsequently, it was observed that all of the beneficial effects resulting from the injection of antiseptic solutions could be obtained by frequent milking without the irritation produced by antiseptics.

Some antiseptics when administered by the mouth are eliminated through the udder. The writer administered hexamethylenamin, better known under the name of urotropin, to a cow in one to two dram doses and demonstrated formaldehyde in the milk in twenty-four hours. Boric acid given in two to six dram doses at the same time to the same animal appeared in the milk in twelve hours. No irritant effects were produced. Iodine is eliminated in the milk when potassium iodide is given and salicylic acid is also excreted through the udder. When doses of 45 grains to 1½ drams of potassium iodide were given daily Labourdette found that the milk contained up to 3¾ grains of potassium iodide to the quart. The amount of the other substances eliminated in the milk has not been determined.

The germicidal power of milk, which is feeble under normal conditions, is increased in mastitis. Its effect on the bacteria of mastitis has not been accurately tested, but the writer has observed a few cases of streptococcic mastitis in which it appeared to have destroyed the organisms of the disease. Whatever advantage can be obtained from this property can be exerted to the fullest extent by frequent milking of the affected quarter.

While bacteria are usually the direct cause of mastitis there are certain accessory or predisposing causes which should receive consideration in treating the disease. These are damp, cold floors, sudden exposure to cold air, excessive cold, drafts, incomplete milking and stasis of milk. Deep milkers are more susceptible to the disease than others.

Usually the fever is reduced by the action of the purgative and the diuretics. Very high temperature indicates septic infection, and camphor, alcohol and quinine are then indicated. Necrosis, abscess formation, indigestion, paresis of the rumen, muscular weakness, posterior paralysis and other complications are treated according to the usual methods.

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DISCUSSION

DR. ROBERTS: Dr. Klein's paper is now open for discussion. Has anyone anything to say?

DR. WILLIAMS: I have listened with a great deal of interest to Dr. Klein's paper, and the lines of treatment which he has suggested are approximately the same as we use. For a long time I have very strongly favored the use of eserine in very acute cases, and have recorded some very interesting results, where the temperature has dropped one degree per hour for three or four hours, until the normal, and where the recovery has been very prompt. Unfortunately, in our work, the majority of cases of mammitis have reached a somewhat advanced stage, where anything that we might do is not very satisfactory, either to the owner or to ourselves.

In our region a great deal of mammitis seems to be traceable to what is ordinarily known as cowpox, which we do not believe is cowpox, consisting of a series of hemorrhagic imprints in the skin, udder, and teat, to be followed later by a large brown or black necrotic area, which suppurates and runs from the margin, and apparently this suppuration causes an infection through the teat inward, which sets up a very severe mammitis for which, up to the present time, we have found no remedy. In one herd in our region twenty-five per cent. of the animals lost one or more quarters within a year on account of this trouble. So that where this disease breaks out in a herd, we pay comparatively little attention to the animals which are involved, or the quarters of the udder which are involved, but ask the dairyman to take very great precautions in regard to the spread of the disease.

Dr. Klein did not mention amputation of the udder. We find that such a procedure is at times quite valuable in animals which are useful for breeding purposes, where we may retain the breeding value or the market value, by removing the entire udder if we like. In other animals which are not valuable for breeding purposes, we may conserve the beef value, which is sometimes considerable. And so far as we have gone in the few cases we have had an opportunity to operate upon, we have been very well pleased with amputation, either of the half of the udder or the entire udder.

Dr. Bolser: I would like to ask the Doctor just one question. In treating those that have not the udder removed, what do you use?

Dr. Williams: I would say that we generally use as an antiseptic for those cases the corrosive sublimate solution, 1 to 1000, as a wash to be used by the milker to wash the udder before milking and after that has taken place. After the milking has been done, in order to prevent the corroding effects of the corrosive sublimate and to continue the antiseptic action, we have been in the habit of using equal parts of tincture of iodine, tincture of arnica and glycerin.

Dr. Bolser: After the milking, you use that?

Dr. Williams: After the milking, yes, sir, and especially over the parts where it is largely supposed to exist.

Dr. Newton: In my experience I have found better results with a cow that belonged to some individual, an old lady for instance. I would say to this good woman, "Now take that cow out of the cow stable, and put her in a box stall in the horse barn, and take good care of her, and she may get well." And I have found that where you had the right kind of a woman, the cow generally got well. Therefore, I believe the removing of the cow from the cow stable, and putting her in a box stall where a horse had been, has probably more to do with it than anything else.

Dr. Case: Mr. Chairman, I would like to ask Dr. Williams if there is any information as to bacterins being used.

Dr. Williams: I don't know of any. Some veterinarians may have used them. Bacterins have been used in streptococcic mastitis by Poels in Rotterdam without any satisfactory results.

Dr. Case: What is the objection to the use of arecolin.

Dr. Williams: The cow shows a great difference in her reaction to arecolin, by no means the same as the horse. A quantity which will give good results in one cow may be entirely too great a quantity to give another cow, disturbing the heart and disturbing the respiration, particularly respiration, and producing a regurgitation of food from the stomach, and it will go back into the lungs, seeming to give a traumatic pneumonia. It is not a safe thing to use in a cow; it is not as reliable in a cow as in a horse.

Dr. Case: In one grain doses?

Dr. Williams: You cannot establish the dose for a cow as you can for a horse. One grain may be all right for several cows, and it may be too much for the next cow.

Dr. Newton: How large doses of eserine or pilocarpin do you give?

Dr. Williams: A grain and a half of eserine, and three grains of pilocarpin.

Dr. Rogers: I would like to say along the same line that the English journals have been filled with instances of the ill effect of the administration of arecolin in cattle. And I would like to ask why some of the English journals, notably the *Veterinary Record,* within the last six months contained quite a number of letters from veterinarians, calling attention to exactly what Dr. Klein called attention to here, the dangerous effects of arecolin when given to cattle. They had a good many funerals.

A MEMBER: I have used polybacterins in two cases of streptococci mastitis, with apparently good results. One case had three doses, and the other one, two. Both of them came around in good shape. I don't know whether it was due to polybacterins or not.

DR. ROBERTS: Is there anyone else that has anything else to say along this line; if not, I will call on Dr. Klein to close the discussion.

DR. KLEIN: I don't know that I have anything to say, Mr. Chairman.

DR. ROBERTS: That completes the program for this afternoon. Does anyone else have anything especial to offer at this time? I would like to say that the section on medicine will participate with the section on surgery in a symposium in Room 1 tomorrow afternoon.

Upon motion made and duly seconded the meeting adjourned.

TUESDAY AFTERNOON, September 2, 1913

The Section on Medicine participated in Symposium of Section on Surgery.

WEDNESDAY AFTERNOON, September 3, 1913

SYMPOSIUM

SECTION ON SANITARY SCIENCE AND POLICE PARTICIPATING

Vice-President GEORGE H. ROBERTS, Presiding.

DR. ROBERTS: I understand that Dr. Stange is not here. Has anyone his paper?

DR. KINSLEY: Neither Dr. Stange nor Dr. Kaupp has sent in their papers. (Dr. Kaupp's paper was later forwarded to the Secretary for publication.)

CEREBROSPINAL MENINGITIS OF THE HORSE[1]

By B. F. Kaupp
Spartansburg, S. C.

Historical. Hutyra and Marek, in their English edition of *Pathology and Therapeutics of Diseases of Domestic Animals*, say: Epizoötic cerebrospinal meningitis of the domestic animals is an independent infectious disease, characterized by inflammation of the membranes of the brain and spinal cord and the adjacent nerve tissue. In certain districts the disease is enzoötic, and even tends to be epizoötic.

In 1896 Siedamgrotzky, Schlegel and Johne simultaneously carried out extensive bacteriological and pathological investigations as to the nature of the disease. Further researches were made by Ostertag in Germany in 1900 and by Wilson and Brimhall in America in 1898 to 1903, making a clinical and bacteriological as well as pathological study. Investigations were also made by Streit in 1902, Harrison in 1905, and Christiani in the same year. Histological investigations by Dexler in 1900, and more recently by Oppenheim in 1907, have furnished proof that cerebrospinal meningitis, or Borna disease, is an inflammatory one.

Siedamgrotzky and Schlegel found a micrococcus, and more rarely a diplococcus, in the subarachnoid fluid. This organism formed a dirty white and sharply circumscribed colony on the surface of gelatin. Intravenous inoculations with cultures into horses in one case produced no effect; in a second there were symptoms and slight brain disturbance, and the micrococcus was demonstrated in the cerebrospinal fluid; a third injection was followed by symptoms of sleepy staggers. Subdural inoculations into horses caused severe meningo-encephalitis, the cocci being demonstrated in pure culture in the exudate.

Johne found diplococci in the cerebrospinal fluid, and in one case in the blood of diseased horses. Some were free and some were included within the cells. The cultural characteristics resembled those of Siedamgrotzky and Schlegel organism, and short chains were formed. This organism was called by Johne, Diplococcus intracellularis equi. Typical symptoms of Borna disease followed the subdural inoculations of the organism into two goats and three horses. All the horses recovered, while the goats died.

Similar diplococci were found by Marcq in diseased horses in Belgium.

Organisms morphologically resembling the diplococci of Johne were found by Ostertag in cases of Borna disease. They were present, as a rule, in the subdural and ventricular fluid of the brain, and occasionally in the blood, liver, and urine.

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[1] Read by title in the absence of the author.

The organism designated by Ostertag as the Borna streptococcus was pathogenic for the horse; cattle and pigs did not contract the disease.

Streit isolated an organism closely resembling and possibly identical with the streptococcus of Borna disease from a case of epizoötic cerebrospinal meningitis in a horse in Ontario, as did also Grimm in southern Germany.

Christiani found an exactly similar organism in primary sporadic meningitis in the horse and in a goat.

HISTORY OF THE PRESENT OUTBREAK OF CEREBROSPINAL MENINGITIS. On July 20, 1912, an apparently infectious disease was observed among horses some ten miles north of Dodge City, Kansas. This disease spread for a radius of several miles, extending over the major portion of Kansas and Nebraska, where the greatest loss occurred, later invading northern Oklahoma and eastern Colorado particularly. For the most part no restriction was placed on intra- or interstate shipment of horses from or in the infected district. So far as the writer knows, no definite data as to actual loss was kept, but it has been variously estimated that from 20,000 to 30,000 horses were lost from this outbreak. Very few mules contracted the disease.

The disease spread to the eastern tier of counties of Colorado about the first of September. Dr. George H. Glover, chairman of the Division of Veterinary Medicine and of the Veterinary Section of the Experiment Station, made a trip to the infected district, and a brief field investigation was made. The station authorities then decided to establish a field laboratory at Holly, Colorado. This laboratory was supported by funds appropriated by the five counties, namely, Prowers, Crowley, Bent, Otera and Pueblo.

APPEARANCE OF THE DISEASE IN COLORADO. An immigrant came to Hartman, one center of the disease in Colorado, just nine days before the first case appeared in that locality. The man had a horse sick of the disease at that time, and after staying a time around the alfalfa mills, went four miles west and camped. Later the sick horse died. The second center where the disease appeared, an immigrant came and camped on the premises just eight days before the first case appeared on that place. The immigrant had a horse sick of the disease. The horse later died. Prior to these two incidents an immigrant came to Granada with a horse sick of the disease. The horse died. No animals came down with the disease at this locality until about four weeks later.

CLIMATIC CONDITIONS. The stricken district lies approximately 4000 feet high and in the dry country. The pastures in the bottoms consist of slough grass, salt grass with blue stem, buffalo grass and gamma grass. These grasses grow sparingly over the pastures and so do not form a matted, bunchy condition. The pastures soon become dry after showers.

A study of the weather records at the weather bureau at Fort Collins shows that more rain fell in northern Colorado, where the disease did not exist, than in the eastern and southeastern parts, stricken with the disease. A study of the records of the stricken district for ten years back shows a greater rainfall in two other years.

On the night of August 13 there was a heavy precipitation, which caused the Arkansas River to overflow. There was only one shower after that time, and that fell the last week in August. There was no rainfall in that district from that time until November.

In the district stricken by the plague there was only one light frost, and no frost heavy enough to kill the sugar-beet tops until after the third week in October.

The greatest loss of horses in Prowers county was between August 1 and September 15.

Feed and Water. Some horses were fed cured cane, some second-cutting alfalfa. The majority were at times on pasture. The ranchmen of Colorado do not feed their first-cutting alfalfa at this season of the year, and it was with some difficulty that we secured some for our experimental animals.

The water supply on the premises where the disease appeared was in some instances from wells varying in depth up to 800 feet. In others from irrigation ditches.

Some of the animals were kept up the entire summer for routine ranch work and were fed wholly on dry feed.

Mortality. Our records show that there were 1838 horses in the stricken district investigated. Of these, 154 contracted the disease and 30 died.

The horses that grazed on the river bottoms overflowed by the August flood did not come down with the disease. A few were on salt-grass pasture. The most were on high, gravelly ground north and a few south of the river. The principal loss was around the towns of Hartman, Amity, and Bristol. These pastures were high, dry, and gravelly.

Horses of all ages, breed, and sex were affected. Dr. Glover observed a case in a suckling colt and others in livery horses on dry feed and constant livery service. Work horses in the field and in the pasture were affected alike.

Clinical Study and Postmortem Findings. In our investigation work we made it a rule to study only typical clinical cases. At death a careful autopsy was held and specimens secured for laboratory study; this included affected tissues, urine, brain, and spinal fluids. The brain and spinal fluids were taken under strict sterile laboratory methods.

A few selected typical case records will be given to better show conditions found:

Case II.—Black mare, eight years old. Went down two hours after taking ill and died in about twelve hours. Has been on native pasture. The source of water was from an irrigation ditch.

Symptoms.—At the time seen the temperature was 104.8° F. Pulse 58 and full. The respiration is slightly accelerated. The reflexes are absent. When pricked with a pin from head to foot and from head to tail she does not flinch. There are a few erosions on the mucous membranes of the lips. The tongue is coated with a whitish, fuzzy, slimy material. The first heart sound is prolonged. The animal nearly falls when pushed, showing great prostration. The animal is stupid. The head is turned to the right side. She refuses to move when urged to do so. Later the animal goes down, showing spasms of the entire musculature. There is a slight rumbling of the bowels. The tail is paralyzed. There is difficulty in swallowing. The lower lip hangs pendulous. There is partial facial paralysis. There is a peculiar tossing of the head. The ears are perpendicular, and occasionally spasmodic movements are noted. The animal braces itself, finally down, and after several hours in a comatose state, dies.

Autopsy.—The brain is congested. This congestion extends into the cord. There is hyperemia of the epiglottis, pharynx, vocal cords and trachea. Both kidneys show active and passive congestion and cloudy swelling. Perineal edema is present. The liver is enlarged and shows congestion and cloudy swelling. The heart shows slight congestion of the vessels of the musculature. There is a verminous aneurysm of the great mesenteric artery, due to larval strongyles. There is a catarrhal inflammation of the stomach and entire intestinal tract. There is a catarrhal inflammation of the bladder, with a precipitation of considerable calcium carbonate. The marrow of the long bones is dark, some areas showing hemorrhage, and still other parts showing congestion.

Case III.—Gray gelding, thirteen years old. Has been sick thirty-two hours. This animal's feed consists of cured cane. The water was from a shallow well.

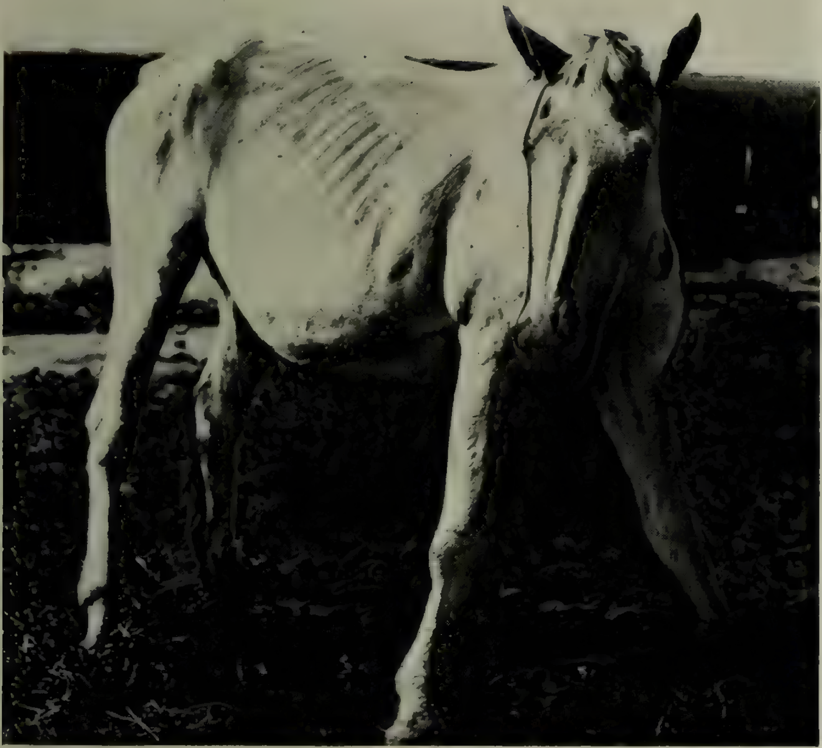
Symptoms.—The head is turned to one side. The temperature is 105° F. The respiration and pulse are accelerated. The animal is weak, with wabbly gait, and nearly falls down when pushed. The reflexes are partially absent. There is grinding of the teeth. There is a bracing attitude, the legs being placed wide aprt. Perspiration appears in spots over the body. The step is rather high, as if not able to judge the step. The animal is up and down. There is a tossing of the head, and the ears are held erect. There is a quivering of the muscles and difficult swallowing. The pupils are normal. The animal rests its head in the corner. An analysis of the urine shows the following: specific gravity, 1022; no sugar; no albumin. The animal is finally unable to stand; down; comatosed, and after several hours dies.

Autopsy.—The tongue is coated with a fuzzy, slimy, whitish material. There is hyperemia of the pharynx, larynx, and trachea. There is a catarrhal inflammation of the gastro-intestinal tract, with small hemorrhages (suggillations) on the stomach, small and large intestines, floating colon and rectum. There is a catarrhal inflammation of the bladder, with small hemorrhages. There is retention of the urine. The liver is greatly enlarged (nutmeg liver), congested, with cloudy swelling. The kidneys show active and passive congestion and cloudy swelling. The heart shows congestion, with small hemorrhages under both the epicardium and endocardium. There is a normal amount of pericardial fluid. There is congestion of the brain, with appearance of inflammation. There are also some pin-point hemorrhages in the ventricles of the brain. The spleen is about normal size, with nodular thickenings. There are hemorrhages throughout the cancellated portions of the long bones.

Case XIV.—Gray mare, twelve years old. This animal has been sick eight hours. She has never been on pasture, but kept up for routine ranch work and on mature feed. The water was from an eight hundred foot well at all times.

Symptoms.—The head is turned to the right side. There is grinding of the teeth. There is a nervous twitching of the head. This animal has some difficulty in swallowing. There is great weakness and prostration. The animal stands in a bracing attitude. (See photograph No. 1.) The eyes are partially closed and the ears are weaving to and fro. The lower lip hangs pendulous and the nostrils are dilated. There is some weaving of the body and the reflexes are partially absent. The hind legs are at times crossed and forelegs spread far apart. The breathing is shallow. At this time the temperature is 104.2° F. The pulse is 52, full and weak. The respiration is somewhat accelerated. There is some slobbering. There is a peculiar smacking noise made by the mouth. The tail is paralyzed. The head at times is carried rather high. The crural group of muscles on the left side are in a state of tremor. The animal stands but cannot walk, and when urged to do so falls to the knees, but with time regains her foothold and arises. There is a droopy condition of the ears. There is ulceration of the mucous membranes of the lips. The pupils are not dilated. The eyeballs roll backward and forward in their sockets. Later, the breathing is labored, dilated nostrils, reflexes absent, no vision; later she goes down. The legs are extended and stiff. The pulse is still large and full. After remaining unconscious for several hours she is destroyed for autopsy purposes.

An analysis of the urine shows the following: specific gravity, 1030; sugar is present in considerable quantity; no albumin.



Horse No. 1, affected with cerebrospinal meningitis. Note attitude of ears, ptosis, dropped lower lip, and bracing attitude of legs.

Autopsy.—The tongue is coated with a fuzzy, whitish, sticky material. The pharynx, larynx, and trachea are normal. The gastro-intestinal tract is normal except a portion of the colon, about one foot long, which shows some congestion and slimy-like mucus. There is a catarrhal inflammation of the bladder, with small pin-point hemorrhages. There is a considerable quantity of calcium salts in the bladder. The liver is enlarged and shows congestion and cloudy swelling. The kidneys show active and passive congestion and cloudy swelling. The brain shows active and passive congestion and more or less evidence of inflammation.

MICROSCOPIC FINDINGS. The microscopic study of sections from various tissues of field cases, after hardening in 10 per cent. formaldehyde and embedding in celloidin and staining with hematoxylin and eosin, showed the following:

Liver. There is active and passive congestion present. There is cloudy swelling and some areas of focal necrosis. There are some areas of round-celled infiltration, with a few polymorphonuclear cells.

Kidneys. There is active and passive congestion, with a few focal areas of cellular infiltration, mostly round celled. Cloudy swelling is present.

Pharynx and Larynx—as well as the stomach and intestines when affected—show congestion and some areas of cellular infiltration.

Heart. There is a congestion of the myocardial vessels.

Brain. The pia-arachnoid membranes are in a state of congestion and infiltrated with round cells and polymorphonuclear leukocytes—acute inflammation. Cellular infiltration, like that of the coverings of the brain, is especially well marked in the cerebrum perivascularly and focal areas throughout the brain substance. Small areas of hemorrhage are noted through the brain substance. The vessels are congested.

Spinal Cord. The section through the central canal shows many leukocytes; many are polymorphonuclear. There is an infiltration around the canal in the cord substance. In the cord substance, and particularly in the ganglionic part, there is a cellular infiltration as well as a few focal areas of round-cell and polymorphonuclear infiltration. The coverings of the cord are congested and are at points infiltrated to a more or less extent than the brain.

URINE STUDY. The urine was studied in four cases. In none was albumin found. There was sugar found in two of the cases. The specific gravity ranged between 1022 and 1050. Calcium salts were also abundant and in suspension. The urine was always slightly alkaline.

Blood Study. A differential blood count was made on six cases, with the following results:

Case I. Neutrophiles, 94 per cent.; lymphocytes, 6 per cent.

Case III. Neutrophiles, 76 per cent.; lymphocytes, 21 per cent.; mononuclears, 2 per cent.; eosinophiles, 1 per cent.

Case IV. Neutrophiles, 91 per cent.; lymphocytes, 8 per cent.; mononuclears, 1 per cent.

Case VI. Neutrophiles, 88 per cent.; lymphocytes, 10 per cent.; mononuclears, 2 per cent.

Case VII. Neutrophiles, 89 per cent.; lymphocytes, 11 per cent.

Case XIV. Neutrophiles, 98 per cent.; lymphocytes, 2 per cent.

Bacteriological Study. Only a preliminary report can be made at this time on our bacteriological study, as the disease subsided before this part of the work was completed.

The spinal fluid was obtained at autopsy by carefully cutting away the musculature over the occipito-atloid space, searing the surface with a hot spatula, and drawing the fluid with a sterile syringe and placing the fluid in a sterile bottle.

In the fluid examined from eighteen cases at autopsy there was found a coccus, at times in chains, and showing a diplococcic arrangement. The organism lost practically all the Gram stain, so that it was practically Gram-negative, although it may by some be considered as lying midway between. The constancy of the presence of these organisms found under these conditions prompted us to try inoculations. These organisms were found in spinal fluid from cases which had been killed for autopsy purposes hours before they would have died from the disease.

This organism forms a dirty gray growth on agar plate. It has smooth, slightly raised borders. It does not liquefy gelatin. It forms a filiform growth on agar slant, showing no tendency to spread.

This organism when injected subdurally in two horses produced symptoms simulating the field cases, and at autopsy showed some of the lesions found in the field cases. When inoculated into the jugular vein it produced toxic symptoms from which the animal showed a tendency to recover, but repeated doses proved fatal.

This organism is always fatal when inoculated subcutaneously, subdurally, or intraperitoneally into rabbits and guinea-pigs, the guinea-pigs showing more resistance than the rabbits.

Chickens showed no ill effects when given by the mouth or intraperitoneally.

Dogs showed no ill effects when given subcutaneously, but some toxic effects when given intraperitoneally, and fatal when inoculated subdurally.

In addition to this organism above described there were five other diplococci studied and proved separate and distinct microorganisms and by animal inoculations to be non-pathogenic. At this time these organisms may be regarded as saprophytic and associated with the horse. For convenience these organisms will be regarded as Nos. 1, 2, 3, 4 and 5.

Diplococcus No. 1.—Upon agar the colonies resemble that of the micrococcus catarrhalis of the human. The colonies appear with a light border, with a denser center, taking on a yellowish-tan tinge with age. The border is irregular. The center is raised. The colony is friable, not viscid. The colony may attain the diameter of 2.5 to 3 mm. It grows rapidly at room temperature. It is Gram-positive. It stains well with ordinary aniline dyes. It is biscuit-shaped, most often in pairs. The approximating edges are flat.

Upon agar stroke there appears a luxuriant growth, wrinkled, with no tendency to spread; at first white, later it takes on a yellowish, then a yellowish-tan color.

In bouillon it produces only a slight cloudiness and a whitish precipitation.

In gelatin, growth takes place along the entire needle tract. The surface growth is limited, showing no tendency to spread, and first white and later a yellowish-tan tinge. No liquefaction takes place.

The organism is both aërobic and anaërobic.

Diplococcus No. 2. This diplococcus appears as a grayish colony, with intact borders and a denser center. Upon agar plate these colonies do not attain the size of diplococcus No. 1. The maximum diameter is from 1 to 1.5 mm. in diameter. It stains with ordinary aniline dyes and is Gram-positive. It grows readily at room temperature. Older cultures become wrinkled, grayish and brittle. The contact borders of the cocci are flat.

On agar slant the growth shows no tendency to spread and is echinulate. Older cultures become wrinkled, elevated, and gray.

Diplococcus No. 3. On agar plate the colonies attain the size of 0.5 to 1 mm. in diameter, and are a light tan color. On agar stroke it has a tendency to grow beaded. The microörganism stains with the ordinary aniline dyes and is Gram-positive. The contact borders are rather flat.

Diplococcus No. 4. On agar plate the colonies are whitish gray and may attain the diameter of 1 mm.

On agar stroke the growth has a tendency to appear beaded. It does not liquefy gelatin and grows along the entire needle tract

In bouillon it may form chains. The bouillon is clouded. It grows readily at room temperature. It is Gram-negative. It stains readily with the ordinary aniline dyes.

Diplococcus No. 5. In gelatin stab it grows along the entire needle tract. It does not liquefy gelatin.

In agar stab, growth takes place along the entire needle tract.

On agar plate the colonies appear as whitish to whitish gray, and attain a diameter of 0.5 mm. These colonies closely resemble those of streptococci.

On agar stroke a beaded growth appears.

In bouillon it may appear in chains. The bouillon becomes clouded. It is Gram-negative. It grows readily at room temperature.

DIFFERENTIAL DIAGNOSIS. Poisoning from eating sprouting potatoes, when it is said large quantities of solinine is contained in the peeling of the potatoes, produces symptoms which have been mistaken for or have been referred to as identical with the horse plague.

Poisoning with mouldy, worm-eaten corn has been referred to as identical with the horse plague. In all our autopsies we did not find liquefaction necrosis, which is always present in the mouldy corn-poisoning cases, although some of our cases lived several days before dying.

Sugar beets, when becoming rotten, as well as other root crops produce a condition which has been likened to the horse plague.

There are many practitioners who are careful observers, and who worked in the stricken district, who share the views of some of the laboratory men, that the horse plague is a separate and distinct disease.

SAGE POISONING. During our investigation work at Holly a call came from Fowler, Colorado, to come and investigate a disease feared to be "horse plague."

History of the Outbreak. The pasture is hilly and covered with native grass. It contains considerable sage which has seeded.

Horses pastured on this ground four years previously contracted the same disease. That was at the same time of year after the sage had fruited. It was noted that the horses acquired a liking for the sage; about thirty horses were pastured on this field and six had become affected.

Four of the cases were only slightly affected and soon recovered, while two were extremely ill and are here described.

Case V.—Bay mare, two years old. Had been down forty-eight hours, but is now up and eats and drinks. There is no difficulty in swallowing. The animal appears nervous. There is a stiff gait and considerable weakness. The entire vertebral column shows a peculiar stiffness. The vision is partially affected. The head is not turned to one side. There is no grinding of the teeth. There is no droopy eyelids. Many other symptoms of "horse plague" are absent. This case finally recovered.

Case VI.—Brown gelding, two years old. This animal has been down twenty-four hours. The temperature is 101.2° F. There is a stiff gait; the animal is nervous. The head is carried rather high. The vertebral column is carried rather stiff.

It has been noted that in pastures containing Artemesia filifolia (one species of sage) that horses acquire a taste for it, particularly after frost has killed the buffalo and other grasses.

Some experiments were conducted by the writer, but only a preliminary report can be given here.

A tincture was made from the dried sage gathered from this field. The following experiments were run:

Experiment No. 1. A young fox terrier dog, weighing eighteen pounds, was given 7 grams of this tincture by the mouth. This was given at 9.40 A.M. on an empty stomach. At 9.50 the animal rolls. At 10.00 he appears weak, partially paralyzed in hind quarters, staggers, and repeatedly falls. At 10.07 there is normal defecation. At 10.11 he vomits. At 10.17 there is marked depression, he lies down continually, and at 10.24 he again vomits. At 11.00 the extreme symptoms are subsiding.

A check was run on this test. The dog used was one weighing the same. This dog was given the same quantity of alcohol that was contained in the tincture given to the dog in Experiment No. 1. The animal rolled, appeared slightly intoxicated, but did not vomit or show weakness of the hind-quarters.

Experiments Nos. 2 and 3 were conducted in like manner and gave similar results.

Experiment No. 4. A white rabbit, weighing about 4.5 pounds, was given 4 c.c. of the tincture intraperitoneally at 4.35 P.M. At 4.38 the rabbit showed weakness of the hind-quarters, accelerated respiration, involuntary urination, stilty spinal column. At 5.18 the animal cannot walk; lies prostrate. At 5.22 he can sit up, and when urged can walk some. At 8.30 A.M. on the following day the animal sits and walks, but appears ill. The surface of the body is cold, indicating poor circulation. The head is thrown back; the temperature is 94° F. The animal died the morning of the 24th.

Autopsy. The meninges are congested. The venous sinuses and veins of the cord and medullary region are congested. The liver is of normal size but shows passive congestion. The heart has apparently stopped in diastole.

A rabbit of the same weight was given the same quantity of alcohol contained in the tincture given to the experimental animal, and in the same manner. This rabbit showed intoxication but not the peculiar stiff spine or the same degree of affection of the hind-quarters.

It is recognized that strong infusions of Artemesia filifolia produce nausea and vomiting in the human. After its administration sleep ensues, with free perspiration. The action of the heart is increased.

The plant grows about one foot high and presents a silky appearance; the stems are single or branched and bear numerous racemous disposed heads in an open pinnacle. The leaves are divided into linear, crowned lobes. It is found in the Rocky Mountain region.

So far as the writer knows those working in the field have not been able to reproduce "horse plague" by feeding mouldy hay eaten by horses contracting the disease, although such experiments were conducted. Neither has the disease been produced by growing any of the various moulds (found on such hay) in the laboratory and feeding it to animals.

We believe that at the present time no one can definitely conclude just what the cause is, and any such statement must be regarded as poor judgment. Future study, should this identical disease reappear, must be made along the lines followed in the last outbreak.

Dr. Roberts. We will proceed with Dr. Kinsley's paper.

Dr. Kinsley. Mr. President and gentlemen of the Association, the subject of the paper is "Forage Poisoning or Equine Encephalomyelitis."

FORAGE POISONING OR EQUINE ENCEPHALOMYELITIS[1]

By A. T. Kinsley
Kansas City, Mo.

This disease received extensive publicity during the past year in veterinary publications, experiment station bulletins, and the daily press; and it is probable that, in a general way, practically all veterinarians are quite familiar with it.

The disease in question has been variously named by different investigators, sanitarians, practitioners and authors as food poisoning, forage poisoning, mould poisoning, cryptogamic poisoning, blind staggers, sleepy staggers, cerebritis, epizoötic cerebrospinal meningitis, epizoötic encephalomyelitis. leukoencephalitis and Borna disease. It should be stated before entering into the general consideration that the foregoing terms have, through the recent investigations of Grimm and Schmidt, Oppenheim, Dexler, and others, been clearly shown to be different names for the same disease. This fact has been accepted by Hutyra and Marek, in their *Pathology and Therapeutics of Diseases of Domesticated Animals;* also by Mohler, in his writings, and by others. The name forage poisoning has its limitations, and many object to its use in identifying this disease, but from available evidence it signifies the source of the cause and there should be no serious objection to its use. The next preferable name is equine encephalomyelitis, as the disease, at least pathologically, is a type of inflammation of the central nervous system, or is a very closely related condition, and this type primarily affects equines.

Historical and Geographical. This disease, or a closely related disease, appeared in Würtemburg in 1813, and prevailed quite extensively in Europe from 1824–28. Its appearance in the United States, so far as records show, was first reported by Large in 1847 and again by Liautard in 1869. In Saxony and the adjoining countries it was quite prevalent from about 1894 to 1900. In 1900 it became so malignant in Borna that the disease was designated Borna disease. Gilruth recently reported a similar disease in Australia. The disease has probably occurred more or less in every civilized country. It has prevailed enzoöotically in various sections of the United States for the past twenty years or more, the most extensive losses having occurred in North and South Carolina, Maryland, Kentucky, Tennessee, Georgia, Florida, Louisiana, Texas, Oklahoma, Kansas, Colorado, Nebraska and the Dakotas. In some sections it is more or less prevalent during the entire year, in other sections it occurs in the winter, and in some sections in the spring and autumn.

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[1] Contributed to the report of the Committee on Diseases.

One of the most extensive outbreaks appeared in west central Kansas the latter part of July, 1912. From here it extended in practically all directions and by the 20th of September it was prevailing in the western two-thirds of Kansas and Nebraska, in the eastern portion of Colorado, in northwestern Oklahoma, in two different localities in Missouri, in some sections of Iowa, and in South Dakota and North Dakota. The disease was quite general throughout the western half of Kansas and Nebraska and southeast Colorado, although some farms and ranches were exempt.

OCCURRENCE. This disease may appear in sporadic, enzoötic or epizoötic form. Sporadic cases are quite common in the southern, central and eastern states. The sporadic cases occur in all seasons of the year. Enzoötics of the disease are sometimes preceded in the same locality by sporadic cases. As a rule the disease becomes enzoötic in locations where extreme climatic conditions have prevailed, as a drought followed by excessive rain and a high temperature. Epizoötics of the disease have usually been associated with abnormal climatic conditions, extending over considerable territory. The climatic condition in west central Kansas, Colorado and Nebraska was abnormal for a portion of July, August and the first part of September, 1912. The weather report of Dodge City, Kansas, from July 7, to 14, 1912, inclusive, shows a temperature of from 90° to 100° F., which is in excess of the average for that season. The temperature from July 20 to 29, 1912, ranged from 91° to 99°. This section had excessive rains during the first week of August, 1912, and these rains associated with a preceding drought and succeeding high temperature, would appear to be a factor in the epizoötic, which was first reported in July as an enzoötic but assumed the proportions of an epizoötic early in August, 1912. Ordinarily the buffalo grass dries and becomes a light straw color in July and August in the section of the country where this epizoötic prevailed. The grass did not dry and cure as usual in 1912, because of the excessive amount of rain and it was found to be literally covered with small specks which were proved to be fungi of various kinds and some thought this had some influence in causing the disease. In accordance with former experience with this disease, many veterinarians predicted that frosts would diminish the losses, and it was found that this epizoötic abated with the appearance of frosts, after which the pastures were used without further losses.

The nature of the soil and the kind of water supplied appeared to have no influence on the prevalence of the disease in the outbreak in Kansas, Nebraska and Colorado during 1912.

Etiology. According to Hutyra and Marek's *Pathology and Therapeutics of Diseases of Domesticated Animals*, this disease is due to infection, although they do not name the infecting microörganism. On reviewing the available literature, one is amazed at the large number of species of bacteria that different investigators have identified as the causative factor of this disease: a micrococcus was championed as the causative bacteria by Siedamgrotsky and Schlegel; Johne isolated a diplococcus and proclaimed it as the cause; a short chain streptococcus was incriminated as the etiological factor by Ostertag; Harrison, of Canada, identified another streptoccoccus; Wilson and Brimhall isolated the diplococcus of pneumonia; Kaupp, of the Colorado Experiment Station, and Haslam, of the Kansas Experiment Station, isolated a diplococcus from cases of the 1912 epizoötic which they considered the causative agent.

After an investigation in Kansas and Nebraska, during the 1912 outbreak, Udall reported "that our evidence does not indicate that the disease is due to food poisoning (forage poisoning, Pearson), or that the food or water is an essential carrier of the toxic or infective agent." In a paper entitled "Epizoötic Equine Encephalomyelitis" (Borna disease), presented by Stange at the Iowa State Veterinary Medical Association, in November, 1912, the following statement is found: "So long as the etiology remains in doubt, there will be more or less discussion as to its exact nature, and it will be confused with sporadic outbreaks of forage or mould poisoning, to which it is related, in my estimation, only, in that it presents a similarity in symptoms." Because of a similarity of this disease to poliomyelitis, a filterable virus has been accused of being the causative agent, but thus far experimental evidence has not supported this theory.

From the foregoing statements by such recognized authorities it may appear as though the infectiousness of this disease should not be questioned, especially when it is considered that some experiments have been reported of the transmission of the disease with cultures of microörganisms isolated from affected animals. To the conservative it is apparent that the attempts to meet the requirements of Koch's postulates have not given sufficiently constant results up to this time to be universally accepted and therefore this disease has not yet been proved to be infectious.

That various microörganisms can be isolated from the brain, or other tissues, of affected horses is an accepted fact; but pyogenic microörganisms, and especially staphylococci, diplococci and streptococci, can also be isolated from the brain of horses that have died of other diseases, as colic, pneumonia, etc., and further, in some instances, no microörganisms could be isolated from blood, brain, cerebrospinal fluids or other tissues of diseased horses by the ordinary cultural methods, nor identified in the tissues by the regular bacteriological methods. To obtain further evidence of the relation of various microörganisms to this disease, Mohler made antigen from each of several cultures of the different kinds of bacteria that had been isolated from the affected horses, and tested it against the blood serum obtained from affected horses for complement-fixation and agglutination, but a positive reaction was not obtained in a single instance. Many unsuccessful attempts have been made to transmit the disease by injection of blood, cerebrospinal fluid, emulsified brain and other tissues, intravenously, intracerebrally, subcutaneously and otherwise. One attack does not modify the susceptibility, as some cases have been observed that had a second attack.

If it is an infectious disease, it certainly is materially different from any other infectious disease with which we are familiar. Scores of instances can be cited where diseased animals were taken into barns and yards where they were associated with healthy horses, during the entire course of the disease or until they died, and there was no evidence of transmission, and further, this association was in the continuous presence of myriads of flies, which were a veritable pest in the section of the country in which this disease abounded. In other instances horses were watered out of the same tanks and fed out of the same feed-boxes that were used in common with healthy horses wihout transmission of the disease. One instance was very striking: On the Missouri Pacific R. R. right of way, between McCracken and Utica (Kansas), seventy-eight teams of horses were used in regrading the roadbed. These horses were fed dry feed from wagons used as mangers on the right of way, and in one instance twenty-four teams were watered at a tank from which three horses drank that died of the disease, and these three horses that died were kept in a barn within ten rods of the above said camp, but not a single horse of the forty-eight contracted the disease; none of the one hundred and fifty-six horses on the regrade had the disease except two that were used for hauling water and were allowed to graze.

In another instance eight head of horses were transferred from a pasture in which several horses had died of the disease to another pasture containing over a hundred head of horses and in which the disease had not made its appearance. At the same time six horses were transferred from the pasture in which the disease had not made its appearance to the pasture in which the horses had died. Later, the exact length of time I am unable to give, several of the eight horses that were transferred to the non-infected pasture developed the disease and died; also some of the horses that were transferred from the pasture in which the disease had not occurred, contracted the disease after being placed in the pasture in which the disease prevailed. None of the animals in the unaffected pasture died with the disease excepting those transferred from the first pasture.

Joest and Degen found nuclear inclusions in the nerve cells of the hippocampus, and have suggested that they may be the cause of this disease. So far I believe no one has positively identified these bodies in cases that occurred in America.

Some investigators, and particularly Rogers, of Kansas, maintained that the outbreak in Kansas was caused by parasites. It is true that intestinal parasites, of which representatives of the family strongylidae predominated, were very prevalent, and there can be little doubt but that some of the diseased animals were depressed by the large number of parasites they harbored.

Quite recently, Purdy, of Kentucky, has published a statement in which he attributed the cause of the disease to trypanosoma, which were probably introduced into this country from South America by blackbirds.

From the foregoing it is quite evident that the exact cause of this disease has not been identified. In the outbreak in the central states, particularly in Kansas, Nebraska and Colorado, it was found that the disease was primarily confined to horses that were on pasture land, though mules were occasionally affected. It did not appear to make any difference as to the kind of soil, whether the pastures were highlands or lowlands, whether the stock were supplied with stagnant water from ponds or pure water from springs or wells. Those who investigated the disease occasionally found instances in which it appeared as though animals contracted the disease that had not had access to pasture land, but upon closer investigation, in nearly every instance, it was found that the animals had been allowed to graze, or that they had been fed fresh hay or even green grass cut from such pasture lands. The only common factor in the pastures was the food, that is, the grass, of which buffalo grass was the most common where the disease was most prevalent, although the disease appears in some pastures in which there was only blue stem grass, and in a few instances alfalfa or timothy and clover were used for pasture, and it seems probable that the cause of this disturbance was derived from or carried by the forage. Many animals in the affected areas that were fed on old hay or dry feed in general were exempt from this disease.

The conclusions of Milks as to the cause of this disease appear in *Bulletin* No. 106 of the Louisiana Experiment Station, and are as follows: "The cause of the disease or its infective nature has not been determined by these investigations. No microörganisms have been encountered that would account for the disease.

If we accept the statement of the different owners regarding the character of the materials consumed by the different animals as absolutely accurate, then the theory of food contamination does not seem to be well taken, for the following reasons:

(*a*) The low percentage of animals affected under exactly similar conditions.

(*b*) The widely separated cases.

(*c*) The fact that the animals attacked were not confined to any particular feed or combination of feed."

The accuracy of the last portion of Milks' conclusions may be questioned, because the statement "If we accept the statement of the different owners" clearly indicates that the source of information was often the stock-owners, and such information is not always reliable.

The cause of this disease, in the opinion of many investigators, is mouldy feed. Mohler, in a paper presented to the Illinois State Veterinary Medical Association, made the following statement: "This theory of toxic fungi is not antagonistic to the facts in many of the best observed outbreaks, and knowing that fungi vary greatly in growth and in the elimination of various products under different climatic conditions, we may explain the irregularity of symptoms as well as the occurrence of the disease under what may appear to be identical conditions."

Mayo attributed an outbreak in Kansas in 1890 and another in 1901 to mouldy feed.

Haslam reported an outbreak in Kansas in 1906 to be caused by mouldy or immature corn, and he further reported that losses occurred in other states when the pasture grass became mouldy. Michener, Trumbower, Harbaugh, Butler, Buckley and others have attributed losses to the toxic effects of moulds.

The following statements are excerpts from correspondence with Dr. Dalrymple and are of interest in this relation:

"We seem to have the trouble in this state almost every year. When it appears in the winter it almost always follows the feeding of mouldy corn, and when in the summertime the grazing on pastures that are attacked with blight of some kind. The stopping of the feeding of mouldy corn generally checks the ailment, and taking horses off pastures that are in the condition mentioned also brings relief. I have seen an outbreak checked by passing the mower over the rank grass in a field in which the disease existed.

Circumstantial evidence seems to point strongly to fungi of some kind, at certain times of the year, but what the exact etiological factor is I cannot positively assert.

At the same time we feel that it can be prevented by not feeding animals on corn in the condition stated; checked by 'cutting out' such feed, not allowing animals to graze on blighted pastures or taking them off such if the disease should break out.

I have seen so much of it from year to year that I can usually tell when to expect it. The prevailing conditions are: showers during the growing season, with intervals of heat. One outbreak I can remember some years ago. There had been showers with heat intervals over certain areas planted to corn. All of the corn from this area was 'rotten'—mouldy,—and the animals fed upon it were affected and the mortality was great. Where the conditions mentioned did not prevail, even in the same locality, there was none of this trouble. Where, even in the heat and moisture localities, farmers took the precaution to bend the ears of corn and allow drainage, their animals did not suffer. Those feeding absolutely sound corn had no trouble, and those feeding other feed than corn escaped the ailment. In other words, the thing narrowed itself down to those feeding mouldy corn, harvested from the area that had been exposed to the conditions that were favorable to the growth and development of mould or fungi.

In this locality I recommended one of two things: either to subject the corn, before feeding it, to sufficient heat to destroy the mould or to stop feeding corn in this condition. The farmers followed the latter suggestion, with the result that the trouble stopped as if it had literally been 'cut off.'

With such experiences I cannot get away from the idea that the active agent is mould of some kind, but mould under certain conditions.

What these conditions are, I am not prepared at the present time to say. However, from a practical point of view, the prevention of the feeding of fungous grain or grass has prevented the disease with us, and the withholding of the same has checked the disease. So, although we may not know the exact etiological factor in the case, we do seem to know the practical facts as above stated."

From the foregoing, in which the various theories have been briefly mentioned, it is apparent that the cause of this disease is not positively known, but the evidence is apparently in favor of the chemical theory. Whether the toxic substance is an integral part of the fungi, or develops in the host plant as a result of the fungus growth, or finally is formed because of some disturbance in the gastro-intestinal canal, is one of the problems to be determined.

SUSCEPTIBILITY. This disease as usually considered primarily affects horses and less frequently mules, hinnies and donkeys; however, closely related conditions are sometimes observed in cattle, sheep and hogs.

Breed, age, sex and general physical conditions, apparently, have no influence on susceptibility. In the 1912 epizoötic about 40 per cent. of the horse population died in the involved area in Kansas, but probably about one-eighth of the total loss was killed by medication. As a rule the animals affected rarely exceed 10 per cent. of the total number of animals in a given location.

SYMPTOMS. This disease is primarily manifested by disturbances of the central nervous system. Inappetence and uncertain gait are usually the first symptoms observed. However, the usual initial symptom is a rise of temperature, which occurs in animals prior to the time that any outward disturbance is noticeable. The initial temperature varies from 104° to 107° F., and continues high for only a short time, usually not longer than twenty-four hours, after which it drops and ranges about 103° F. Exceptions to this general range of temperature are found in cases complicated with pneumonia or other inflammatory disturbances. Colicky pains may, in rare instances, be the first symptom evidenced.

Depression, with drooping of the head and closing of the eyes, associated with difficult deglutition and staggering gait, are common symptoms within twenty-four hours after the first evidence of the disease. At this stage, *i. e.*, twenty-four hours after the onset, it is not uncommon for an animal to place its head against a manger, post or other obstacle and push to the extent of his muscular power. In other instances they may walk in a circle, either to the right or left.

Excitability is observed in some cases and may continue throughout the entire course of the disease. In these cases the head is held high, the nose being projected. In the excitable cases the conjunctiva is usually congested in the early stages and becomes icteric as the disease progresses.

Suppression of the peristalsis and drooling are observed in many cases. Dribbling of urine, due to paralysis of the cystic sphincter, is a frequent symptom in the later stages of the disease.

The uncertain gait becomes more and more marked as the disease progresses; not infrequently the patient will support itself by leaning against buildings, fences, etc., until paralysis has advanced to such a degree that they lose their balance, fall, and remain in the decubital position until death, which intervenes in from twenty-four hours to six or seven days after the onset. While in the decubital position, pawing or continuous movement of the front legs is not uncommon, the hind legs remaining at rest and usually paralyzed. Muscular twitchings, particularly of the muscles of the lips, are common. Muscular spasms of the cervical region, flank, loin, and croup have been observed.

The pulse will vary according to the nature of the case. In those cases which show marked depression from the beginning, providing there are no complications, the pulse is full and quite regular, but becomes soft and compressible and is frequently imperceptible prior to death. In the uncomplicated cases that show excitability the pulse is rapid and strong in the beginning, but becomes more rapid and weak before death.

The respiratory symptoms vary about the same as the circulatory symptoms, *i. e.*, where there is depression, respiration is slow, during excitement it is rapid. Pulmonary complications are quite common, particularly gangrenous pneumonia due to pharyngeal paralysis, and in some cases the expired air is quite offensive. The tongue becomes paralyzed in some cases. Impairment of vision appears early in some cases, especially the severe cases.

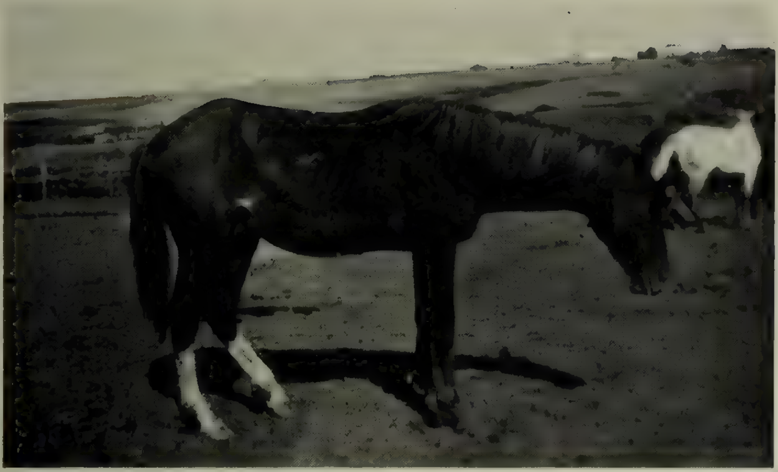
Mechanically inflicted wounds of varying intensities are observed in the later stages on most patients.

PROGNOSIS. This is a highly fatal disease, the recoveries rarely exceeding 5 per cent. of the affected animals. Those that recover are usually damaged, *i. e.*, they are dummies or blind, or have other defects.

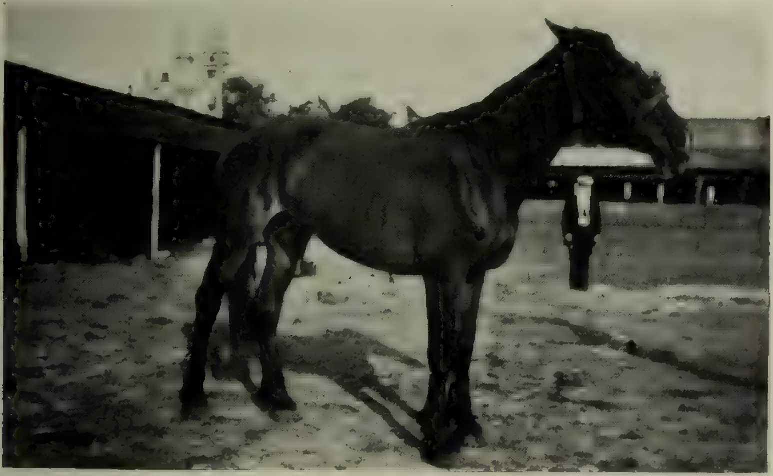
COURSE. The course is variable. In the beginning of an outbreak the entire course, from the first symptom until death, is in some instances not longer than ten or twelve hours and rarely exceeds two days. The intensity of the symptoms diminishes as the disease progresses, and in the later part of an outbreak the course may be prolonged to ten days and some cases may recover.

LESIONS. The lesions depend upon the course of the disease and the complications.

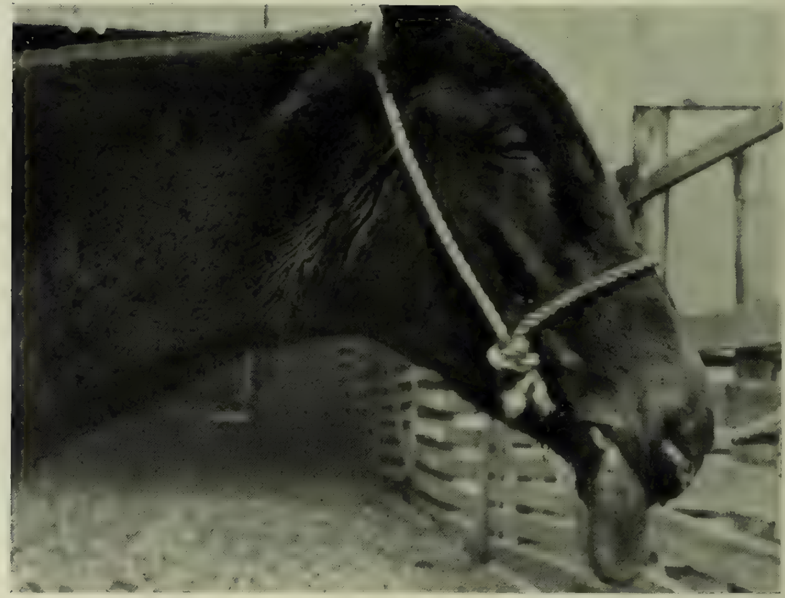
In autopsying animals that have died of the disease, within thirty-six hours after the onset, the striking thing is the general absence of any macroscopic lesions sufficiently marked to account



Drooping of the head and general lassitude typical of this disease. (Photograph loaned by Dr. H. F. Palmer, of H. K. Mulford Co.)



General attitude assumed by those animals that have an excitable stage. (Photograph loaned by Dr. H. F. Palmer, of H. K. Mulford Co.)



Lingual paralysis observed in some cases. (Photographed by Dr. G. R. White, Nashville, Tenn.)

for the intensity of the symptoms. In those cases which die within twelve hours after the onset there is usually an engorgement of the liver. In most cases there is a venous congestion and capillary engorgement of the pia mater of varying intensity, which may or may not be accompanied by edema of the meninges and a dropsical condition of the ventricles, the cerebrospinal fluid varying in quantity but frequently being in excess of the normal. An occasional case may be observed in which the cerebrospinal fluid is milky in appearance, although it is usually clear.

In autopsying animals that have been affected two or three days or more, many lesions in addition to the foregoing, the most of which are secondary, may be observed. Pharyngeal and laryngeal inflammation is quite common in these cases. Gastritis and enteritis of varying intensity may be present. Epicardial petechial hemorrhages are sometimes observed. The adipose tissue is frequently more or less icteric.

A large percentage of the animals autopsied in the 1912 epizootic showed complications, as gastro-enteritis, nephritis and cystitis, but these lesions could invariably be traced to the use of drugs.

The principal microscopic lesions are confined to the central nervous system, and consists of a small round-cell infiltration around the bloodvessels in the gray and white matter, being most prominent in the olfactory lobe and the hippocampus. There was some evidence in some sections of degenerative centers, affecting motor cells especially.

The pathological report on the disease in Kansas, by Dr. A. L. Skoog, Associate Neurologist of the University of Kansas, is given because considerable time was consumed in this investigation, although only two cases of the disease were studied:

"This report embodies gross and microscopic studies of material obtained from the central nervous system of two selected horses from western Kansas. One of the horses had been ill a few days with typical symptoms of the plague. It was in Jetmore, where there were a great many cases and the largest percentage dying after a very short illness. This horse was down and expected to die at any hour. It was killed with chloroform and a complete postmortem promptly made by Drs. Trimble and Skoog. Nothing was found in any of the thoracic or abdominal organs that would account for the serious illness. The brain and spinal cord were examined and portions removed to be placed in fluids so that microscopic examinations could be made later. The second horse was a typical case with a severe attack of the same malady. The autopsy was performed by Dr. Trimble, at Ness City, and blocks of tissue from the central nervous system were preserved for microscopic studies. Dr. Trimble reported findings in the organs of the central nervous system as being practically normal.

Smears from the tissues of the central nervous system and cerebrospinal fluid were made and stained for microörganisms, but none were found.

The dura was normal in both cases. The inner meninges, or pia and arachnoid, showed slight congestion in a few places on the spinal cord and medulla. There was possibly a little edema present. The meninges over the brain were practically normal.

The cerebrospinal fluid was apparently not increased to any great extent. The ventricles were not dilated.

Cross-sections at various levels in the brain and spinal cord did not show any hemorrhages. In the gray areas of the spinal cord and medulla there appeared to be some congestion.

Microscopic Examination. Nissl, Van Gieson and hematoxylin-eosin stains were utilized for these studies. In more than a hundred microscopic slides I could find no minute hemorrhages.

The leptomeninges of the spinal cord and medulla showed here and there small areas containing a few infiltrating leukocytes. In none of the places were the leukocytes found in any great numbers. In a few areas these infiltrations could be followed in the septa dipping into the spinal cord. The pia and arachnoid showed some evidence of edema in a few places.

The white columns showed some infiltration more or less diffused. It was most severe in the cervical section of the spinal cord, and medulla. The gray substance in the spinal cord had a considerable amount of infiltration, greater in the anterior horns. These infiltrations were chiefly perivascular in type. They involved both arteries and veins and we might say practically were confined to the adventitial coat. In the upper cervical region and the medulla I found considerable amount of diffused infiltration. Most of these infiltrating cells can be classed as lymphocytes. Some of them were of the endothelial type.

A study by the Nissl method for pathological changes in nerve cells of the gray substance in both the spinal cord and the medulla showed that in no sections was there a complete destruction of all the motor cells. In some of the areas where the infiltration was most marked a considerable amount of chromatolysis and some axonal degeneration were observed. These changes were considerably greater in the cervical and upper dorsal cord. A great many of the cells showed a tendency to take a homogenous stain; thus the tigroid bodies did not stand out as boldly as in normal specimens. Some of the cells had their nuclei displaced toward the periphery. The nuclei were destroyed in a few cells. The nucleoli did not display themselves as boldly as is observed in normal cells. There were practically no changes in the nerve cells of the posterior horns and Clark's column group of cells.

The severe pathological changes in the gray substance of the upper cervical portion of the spinal cord and the medulla would account for the serious and death-dealing symptoms. In this region are located important centers controlling respiration and circulation.

There is apparently some severe intoxication process which has a high degree of attraction for the central nervous system and particularly the delicate gray substance of the spinal cord and the medulla. What this substance is cannot be determined from pathological examinations. It seems most likely that the cause might be found in the forage."

DIAGNOSIS. Because of the variations of the symptoms and the slight lesions found, this disease is not always easily identified. It can usually be differentiated from cerebrospinal meningitis because of the absence of meningeal lesions and symptoms resulting therefrom. It may be differentiated from rabies by the demonstration of Negri bodies in the nerve cells of the rabid animal, and the absence of Negri bodies in the nerve cells of an animal affected with forage poisoning.

From cerebritis and myelitis the differentiation depends upon the presence of an excessive number of leukocytes in the nervous tissue in the inflammatory diseases, and the presence of the normal number of leukocytes in the nervous tissue in the disease in question. The disease probably has more similarity to acute poliomyelitis than any other disease, and from this disease it may be differentiated by the fact that there is greater destruction of the cells of the anterior horn of the cord in poliomyelitis than in this disease.

TREATMENT. Medicinal agents have proved of little or no value in this disease. As a matter of fact, an affected animal usually fails to respond to drugs. The nature of the lesions and their being confined almost entirely to the brain is sufficient explanation of the failure of drugs to produce the customary action.

It is possible that many horses were saved in the 1912 epizoötic by the use of brisk purgatives on animals that had been exposed to the common source of the disease, thus removing the cause or the carrier of the cause.

For purgation, arecoline gave fairly prompt results. A combination of aloes, barium chloride and creosote was used with fair success, the creosote acting as a vermifuge, as was indicated in the majorty of animals in the section of the country where this disease abounded.

Other treatment probably did more harm than good. Some recommended antispasmodics to relieve the muscular spasms, but they had little or no action.

PREVENTION. One attack does not confer immunity, as many cases have been known to have a second attack. The production of an immunizing serum would be highly improbable when no protective immunity results from an attack of the disease. Vaccines or a bacterin cannot be produced that will be of value unless the disease is infectious. The usual source, or at least the common carrier, is apparently the food; therefore to prevent the disease the susceptible animals should be fed a clean, non-mouldy, wholesome food and maintained under sanitary surroundings.

The question is frequently asked, "Will there be a repetition of this serious epizoötic?" To predict the future is difficult. Such a widespread epizoötic may never appear again. The determining factors reside largely in the climatic conditions.

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DISCUSSION

Dr. Roberts: Gentlemen, you have heard an excellent paper on a subject comparatively new to most of us. It is now open for discussion.

Dr. Reichel: I understand the subject is now open for discussion. I made a few notes as Dr. Kinsley went along, and I would like to bring out just a few things that he has evidently omitted in making his abstract.

In making autopsies of unmedicated or untreated cases in Kansas, no uniform distinct congestion of the lower part of the esophagus and the upper half of the stomach was observed, and this is particularly of interest, in that the Germans have recently pointed out that they regard the information as an indication that the infection entered the system through those parts. On sectioning both the spinal cord and the brain of chronic cases it occurred to us that the changes were as extensive in the spinal cord as they were in the brain, so the name of encephalitis, without considering spinal lesions, seems to be inappropriate.

In regard to the histological changes that may occur, Dr. Kinsley used the word infiltration of round cells. As most of you know, the spinal cord is surrounded by the endothelial layer of cells, and the most striking thing about the changes as we saw them in chronic cases was the very distinct proliferation of the endothelial cells, with little or no infiltration of new cells. The changes from that standpoint are absolutely identical with the old proliferation changes seen in cases of rabies, proving that it is really on those cells that it is producing the change or the proliferation.

Dr. Ranck: Mr. Chairman, this forage poisoning proposition to my mind in the South is a very important condition. We cannot say it is a disease, because, as the essayist has told you, there are a thousand and one things that you will find in those conditions. Whenever a body of men that are holding a postmortem examination don't know just what to call the thing, they will say forage poisoning. It seems to be something that covers a multitude of sins. Now forage poisoning don't mean anything; at least in a great many instances it don't.

Now we have conditions, as Dr. Dalrymple has cited, in the South in connection with feeding mouldy corn. These last few years we have had an epizoötic of forage poisoning that we could trace directly to the production of hydrocyanic acid. If you have a large pea crop and cut the hay from the ground, and a heavy frost comes along and hits those pea stubbles, as the farmers say, and you turn the animals in there, they will die, not a few, but sometimes as many as forty or fifty.

I had one outbreak of what we called forage poisoning, or hydrocyanic poisoning, where we lost fifty pure-bred Angus cattle in twenty-four hours.

I had an outbreak of what I had to conclude was forage poisoning in dogs. We have a man in the eastern part of Mississippi who is a dog trainer, bringing dogs down from the North and teaching them to hunt. I had a big epidemic that was reported to me by one of my assistants, one of the state veterinarians, and I had some fifteen or twenty of those dogs sent to the college, and the only thing that I could find there was an excessive irritation of the turbinated bones. I could not find anything else at all, and yet those dogs would keep pawing just like in a form of rabies. This man told me that if he would take those dogs out when there was a heavy dew on the grass, that they would not become sick, which led me to suspect rather that they got some form of pollen or something like that that caused this disease. I don't know what it is. We have had bacteriological investigations made, and they couldn't tell us anything.

We have a condition in horses and mules that I know is forage poison, and in which an animal will get a peculiar class of brain symptoms, that I was in hopes some of this discussion would bring out, because I want to know what it is, as we have not been able to determine the fact. Although we could get quite an intimation of meningitis in the brain, I don't know what it is. They will scratch in several places with their feet. For instance, I have had a mule scratch just back of his ears until he would rub all the hair and the flesh off the side of his neck. I have seen cattle rub along fences until they tore the skin and flesh from the sides of their neck. They don't seem to have this peculiar irritation in any other place than just back of the head and along the neck.

I have had another outbreak in the Mississippi Experiment Station, where we are conducting large mule-breeding experiments, in which we have had forage poisoning from feeding those pregnant mules with soy bean hay that had become mouldy. I thought I had contagious abortion among our mules. We lost eight or ten colts right in succession. I sent to one of the biological laboratories, and they sent me some abortin and abortis bacterin, and I tested them, and pretty soon the epidemic stopped and none of those animals would react to it. It was due to the carelessness of one of our men connected with it, as I found, when we were in the midst of this abortion epidemic with the soy bean hay, and the mere stopping of it stopped the trouble. So we have troubles down there, too, and we would like to be helped out. I just mention these facts because when Dr. Kinsley wrote to me to add my mite to this paper, if I knew anything about it, my reports from the assistant state veterinarian had not come in at that time, and I was not in a position to say anything. But this is very serious with us. We are trying to raise stock in the South, and we need help; we need more veterinarians down there; we need more bacteriologists, and so I will assure you, gentlemen, that if we can get anything out of it we will certainly appreciate it.

Dr. Dalrymple: Mr. Chairman, I have nothing that I could add. I was just thinking about this hydrocyanic poisoning, and I was thinking that, although we are just a state away from Dr. Ranck, yet we have some of the same troubles. We don't apply the name of forage poisoning to this affection, but we find it on different classes of soil. We have certain areas where we find this disease, and it has been found that there is some relation between the second growth on these areas and the disease.

In reading some of my foreign journals, I found occasional reports where meal from the leguminous seeds of different kinds have produced this hydrocyanic poisoning. I have noticed sometimes in some of the English journals where soy bean meal has been the cause of bringing out this hydrocyanic poison. Some of the farmers asked me how it was that beans grown on the lowlands would destroy their animals, and the peas and beans grown on the highlands were perfectly safe. In fact they went so far as to say that the chickens would select the peas from the highlands and leave the peas from the lowlands, but that is a little far-fetched I think.

But we have reports pretty much every year of poisoning from this prussic acid. Our people who live in those sections are generally familiar with the conditions and they seem to take precaution to allow the animals to have something to eat before turning them onto these places, or of turning them on at short intervals of delay until they gradually become accustomed to the change. I have known of animals brought up from one of those pea fields, and as soon as they got water they would die very rapidly. I presume it produces a solution of the poisonous material in the alimentary canal. And we have some severe losses from that hydrocyanic poisoning which we have not been accustomed to call, however, forage poisoning. It is many years ago since I saw the conditions that Dr. Kinsley referred to, and I did not expect to hear that abstract this afternoon from anything I could have told him. But I notice this, that where animals were being raised on very short grazing, that there was very little trouble; in other words, where the grazing was thoroughly exposed to the bactericidal action of the sunlight we did not seem to have much trouble, but it was largely or usually where the grazing was very luxuriant, possibly the shorter, finer blades of grass protected from the sun by the ranker growth. It was mostly in cases of that sort that we had that disease. I don't know just what to call it, I don't see many names for it, but it is the particular disease we are talking about, and that is what suggested to my mind to recommend to the party who asked me about it, to run the mower over his long grass and cut it down short, so the whole thing could be exposed to the sun.

Of course we are all aware that moulds of different kinds don't stand the sunlight. You know how your shoes get mouldy when placed in a dark closet, and it is the same there. Sunlight is a great bactericidal agent. When I saw the great outbreak in the Kansas papers (and it was all from the papers, for we didn't get any knowledge of it in any other way), one of our New Orleans papers, to which I contribute sometimes, asked me to give an opinion for publication. I did so merely by presuming that it might be the disease that we were having regularly in our own state. As far as I know, it has turned out to be just about that same thing, in the finding of the committee, I believe, who was asked to investigate.

I found, just as the doctor stated there, that we did not get response at all to medicines after the brain becomes affected; but if the diagnosis is made very early, and cathartics are used freely, we get an elimination through the emunctories, and we go along without trouble. Once the nervous system becomes affected, it is hard to get the animals to respond to any sort of medication that I have seen. It is a terribly fatal disease, and I have been preaching prevention more than therapeutics in my practice.

Dr. McInnes: I would like to ask Dr. Ranck if in his cases he knows what the ratio is of recoveries.

Dr. Ranck: No sir, I have never seen one recover of that type. In connection with most of those cases, so far as poisoning is concerned, they have a normal or a subnormal temperature.

A Member: I have had two cases in mind, one of a very vicious horse, which kicked and bit pretty extensively. I put him in a sling, and I thought I would see if that would cure him. He rubbed his face and neck, and great swellings came up. Both of those cases I had, acted in the same way. One case that we put in a sling lived about four days. The other lived about three days. One was a mare and the other was a horse. The symptom first noticed was just a little pawing, not like hydrophobia, because I have had two of them, and it don't act like that at all.

Dr. Dalrymple: Mr. Chairman, I saw some cases similar to what this gentlemen has referred to, and quite recently I saw the last outbreak where four animals were shot and several died. We took the brain and made an examination of it, and I had an emulsion of it made and introduced it into some other animals and it produced rabies. They were really cases of rabies, and those were the symptoms.

Dr. Ranck: A few years ago I had a bacteriologist in Natchez, Mississippi, make ten inoculations in ten different rabbits from animals with this disease, and we could not detect rabies. I thought probably that might be the case, but I am satisfied that those cases I spoke of were not rabies.

Dr. Schoenleber: I am sorry I did not hear all of Dr. Kinsley's paper, but I assure you this, that Dr. Kinsley has given you all there is to that subject, because he usually does. The doctor was out in the fields and I also was out in the field several months, and I will frankly say that I don't know anything about the trouble that we had in Kansas last year. I will say this, that in studying this matter, the more I studied it, from my observations in the field and in the laboratory, I am a little inclined to think that there is an element of contagion present, although, as I said before, I don't know anything about it.

Dr. Roberts: Are some of the state veterinarians present here that can tell us their experience with this trouble and what they think of it? Dr. Douglass have you had any experience with this trouble?

Dr. Douglass: Mr. President, our experience in the state of Louisiana with this type has been so peculiar we are just like the rest of them, we don't know where we are. We make up our minds to a certain cause of it, and the next case we get we have to change it. We have got a pasture down on the Chantilly Road of about eighty acres that we call the meningitis pasture. In the spring we advise everybody to take the horses and mules off and leave the cows on, because the cows don't get it very easily; we have very few cases. We will lose on that pasture six or eight or ten cases a year. The horses and mules that take meningitis from this particular pasture all die. Now I can call to mind half a dozen cases. This summer I had a case for a man that sold soda water. He had a single horse, a creole pony. One day he telephoned to me, and he said, "Come out right away." I went out there as quick as I could, and his pony was running sideways. He was in a space of about four city lots that had been fenced in and grown up very high in weeds and very high in grass and a chicken fence through the center. He said the pony had put the chicken fence and the chicken house out of business, and when I got there he was leaning against the fence. I told my friend, "That pony is going to die." It happened the only thing I had with me was a bottle of strychnine tablets. I gave him a hypodermic injection of strychnine and told him to give him a tablet at certain intervals, and in four days he made the nicest recovery I ever saw. In seven days he was back in the harness.

I believe the next case I saw was down on an island. When I got down there the horse was down with his head in the corner, standing up behind and kneeling down in front. I didn't have any strychnine tablets with me this time, so I gave him aromatic spirits of ammonia, two ounces in three hours, and he made a nice recovery.

About a week later this man, a neighbor of mine, had a mule that showed the same symptoms, and running in the same lot. I just smiled and put him on two ounces of aromatic spirits of ammonia every two hours, and he died.

The next case I ran into, a week or two later, was an exceedingly fine horse that belonged to a mattress company. This horse had his own yard back of the mattress factory where there was not one spear of grass in the yard. He was fed on the finest Indiana timothy hay, the finest of oats, and filtered city water, and he had a genuine case of what we called meningitis, and he had just one hundred feet square for him to stand up in. He would run sideways, fall down, get up and run around again.

His limbs were incoördinate to excess. We threw him down, sent for the ambulance, hauled him to the hospital to get him out of the man's sight. because I knew he was going to die, and he was the pet of the street. I got him over to the hospital and I strapped both front legs together so he couldn't get up, and then he got up and walked around with both feet tied together. I gave him a violent purge of eserine, strychnine and arecoline, and got good action. He made a splendid recovery. Now it seems to me that when we make up our mind that it is forage poisoning, the next case we get is in a lot where he doesn't get any forage. I inquired very particularly if this horse had been eating grass among the mules, and they assured me he had not, and a white man was driving.

In certain localities on the Chantilly Road they all die. In Southport they all die. Out on the Ridge Road with the same symptoms, running on grass, they usually recover. These clinical symptoms lead me to believe there must be three or four causes, or three or four kinds of this disease. You can usually find it on pastures where the grass has grown very rapidly and luxuriantly. You know we have rain almost every day down there, and it is a hot, damp climate. It will rain in the forenoon, and then the sun will come out bright during the afternoon; we have a nice shower and bright sunshine, and the vegetation grows very luxuriantly. In these cases there must be two or three different kinds, because in one pasture they will all die, and in another pasture a few miles away they will respond in five or six days under treatment, and they will make a good recovery.

We are entirely in the dark, and if you can give us any help, we would certainly like to have it.

Dr. Bolser: I am worse off than the gentleman was, for I don't know anything about it. After the reports came out I wrote to Dr. Kinsley. You remember I wrote you about the diagnosis, and that we in Indiana did not have any trouble, at least in that part of Indiana I was located in we did not have any trouble. I was seeking information, and I at once wrote Dr. Kinsley, and he wrote me a very nice letter and told me all he knew about it at that time, for which I was very thankful. I am very glad to hear of these reports and hope we will get the correct solution eventually.

Dr. Douglass, did you continue these cases that recovered, on the strychnine?

Dr. Douglass: I gave them at first strychnine every five hours hypodermically until they began to show improvement, then made the dose every four hours, and then three times a day. I only gave one purgative.

Dr. Udall: Mr. Chairman: Unfortunately I was so engrossed in dinner that I missed the papers, so that anything I may say may not apply to what has already preceded. I hesitate about saying anything in regard to the disease, realizing that discussions of this character will not settle it one way or the other, and in all probability will have very little influence upon the opinions that are already held by those who have seen or have not seen the disease.

We realize that in the disease that occurred in Kansas and Nebraska last summer we had an enormous outbreak, and that there is quite a difference of opinion in regard to the nature of the disease, as to whether it was so-called forage poisoning or so-called cerebrospinal meningitis. As it appeared to me in those sections (I went out there from the East and I don't know very much about western conditions), I cannot from my standpoint believe that it was forage poisoning. The cases were distributed in widely different sections, only a small number of horses sick on one farm, and a whole lot on another, and in between horses were not taken sick at all, where they had taken no precautions whatever, and I could not see where there was any good evidence that forage was responsible for it. I found horses lying dead that had been eating alfalfa, perfectly cured, much better than any alfalfa we are getting back in the East, and it was hard for me to realize there was fungi in it.

In looking up the cases, I found some controversy in the German literature in the same way in regard to the disease, whether it is infectious or whether it is a little something in the water or in the food that has not yet been defined.

There is a striking difference between the class of cases that are listed in Professor Pearson's so-called forage poisoning and the outbreak we had there. If you look up the literature, I believe that the term "forage poisoning" originated with Leonard Pearson. He examined an outbreak where seven horses were sick in a stable, and five of them died, and I believe two of them recovered. Those horses were all of them sick in the same place, they had access to the same food. He took some back to another place and produced the disease. His object was to demonstrate that it should not be called cerebrospinal meningitis, as he found no evidence that the nervous system was diseased in his experiments, but unfortunately it seems to have added to the difficulty rather than taken away from it. And in the investigation by McCarthy there is another example of this kind.

In Philadelphia horses were eating a certain feed. A number of horses in the same stable were taken sick; they stopped this feed, then poured in some more on top of it, and when they got down to that again, the disease reappeared, but it was confined to that stable. They were able to reproduce it experimentally. No one has ever been able to reproduce this disease we had out in Kansas and Nebraska. I believe that is an entirely different type of disease.

In looking up the literature I find the opinion of Joest, working under the direction of the King of Saxony for three years, is that it is an infectious disease of some unknown origin and some unknown cause.

Professor Schmidt has reported on some conditions based on the tabulation of five hundred cases. His report came out last August, and he reached the same conclusion as Professor Joest did, that the Borna disease is the same as we have had here. The symptoms correspond to it. There are pretty good authorities on both sides of the question as to whether that is due to some chemical agent that gets in the food or water, or whether it is due to some infectious agent of an unknown origin. Professor Schmidt suggested it might be in the soil. In regard to the transmissibility of the disease from one animal to the other, I don't know of any, but I believe that it is indirectly transmissible, and in some cases that it is contagious.

I believe some of our most excellent authorities who have done the most work recently are agreed on the point that it is not due to chemical agents that are within the forage itself or in the water. But I realize at the same time that it is nothing but the expression of an opinion, and it doesn't interest anybody.

Dr. H. Moore: Mr. Chairman, I have had some little experience with this so-called spinal meningitis or forage poisoning. Spinal meningitis always appeared to me to be a very bad term. I have held postmortem after postmortem, on any number, and I have never found anything in the postmortem lesions that indicated there was any abnormal condition in either the spinal cord or the brain or the meninges. I have had the experience like Dr. Douglass did; we have treated a great many cases where you would think that you were almost discovering the specific, but when you use the same medicine on another case you get no more effect than so much water. I recall one case that I had, or one outbreak that I had. It was a right good client of mine and we had had a pretty dull month. I said to him, "What seems to be the trouble with you, have you changed doctors or doing your own doctoring?" He said, "No, we are getting along pretty well, now." I said, "All right, I will take a look around your yard and sprinkle a little powder around." This was in the afternoon about four o'clock. Ten o'clock at night he called me and said, "I wish you would come out here, and come out in a hurry." I went out and found four nice, big, fat, lazy mules all laid up against the walls." He said, "Well, I see you sprinkled the powder around."

I looked around and I looked in his hayrack, and I said, "Where did you get this stuff?" He said, "I got it down the Chantilly Road" (the spot that Dr. Douglass mentioned to you). I said, "Well, take it all out the first thing you do; take it all out." I gave four grains of a hypodermic injection of eserine, pilocarpin and a grain of strychnine. I said, "Here is a mule that is going to die, and she is going to die in a very short time." I said, "This one looks like she is amenable to treatment, but these other two are bad." I called the ambulance and sent those two to the hospital. The one I told him was going to die, died in quick time, and the other one I treated, and I treated her for two or three days. After this intestinal evacuant, which I always administer, I give strychnine according to the nervous temperament of the mule, and I follow it right to the toxic line almost, sometimes give it once in five hours, sometimes four hours, sometimes three times a day, and taper off gradually. The two mules that I sent to the hospital made a good recovery. I made him send out and get some timothy hay that night, and change his watering trough, and incidentally he had a well, not a driven well, but a dug well. I said, "Let that water out, and put city water in there for tonight." Well, we took this hay out and spread it in the lot for several days, turning it over every day. I told him, "If this hay is cured properly, you can go on and feed it judiciously and with impunity, but *don't* feed it in this condition." Now he took this hay and took most of it out, and went on and had it cured.

About the time he had it pretty nearly all cured, he thought rather light of it, and he fed some of this hay to another man's mule, (laughter) and this other man's mule got a nice case of forage poisoning, so that it was a positive conclusion that I arrived at that it was the hay.

Now Dr. Dalrymple mentioned that he had seen cattle come off from a pasture, and after they got to water that they succumbed very quickly. I have seen pastures where they have ponds in them, and after a flooding rain, such as we get in Louisiana—we get very heavy flooding rains—flooding the pastures, and after the water recedes and this pond is filled, it looks like all the deposits of organic matter are washed into this pond. And I have seen any number of cases where the animals have grazed on a pasture for weeks, and possibly months, and then after this rain it is too late for successful intervention; they are practically dead.

Now I do think, as Dr. Douglass stated to you, there are different forms of the disease in different sections of the country, and it looks like there is one section of the country, that any time you get one from there, you might as well give him ten grains of strychnine, for it will save time and expense for both you and the owner. Other cases I have found were amenable to treatment and recover very nicely. I take them and give them a purge, and if I have one that requires any assistance at all, I put him in a sling. If he cannot stand at all in a sling, let him lie in a recumbent position. Strychnine is the first thing that I use after giving the intestinal evacuant, and I suppose I have had probably forty fairly good recoveries, but it makes all the difference in the world where they come from.

Dr. Mayo: Gentlemen, I am very much like Dr. Schoenleber; I have seen this or a similar disease in various parts of the United States and Cuba. I have heard almost as many theories in regard to it as I have heard men speak, and everything is purely theoretical, and I don't know anything more about it than I did before.

Dr. Eichhorn: I just want to relate the work that has been done in the pathological division of the Bureau of Animal Industry in regard to the outbreak in Kansas, and also subsequent outbreaks in different parts of the United States. I only want to speak from a bacteriological point of view with reference to this condition. Dr. Buckley, who was on the ground in Kansas during the outbreak, obtained plenty of material for bacteriological investigation. Some of it he forwarded to the laboratory, and some he used himself after he returned. The material he forwarded was used for inoculation experiments, and also for cultural work to determine whether we could isolate the specific organism. It was inoculated into animals in various ways. Some received intracerebral inoculations and others subcutaneous and intravenous inoculations. Dr. Buckley also obtained the spinal fluid from affected animals, which was also utilized for cultural inoculations. Some horses received 3 to 4 c.c. of this material into the brain and others were given as much as 10 c.c. intravenously. In no instance did we produce a condition which resembled cerebrospinal meningitis. About a week ago a request was received that an expert be sent to Wilmington, Del. Dr. Buckley returned again with the brain and plenty of material for inoculation. He obtained it under sterile conditions, and to prove this, he inoculated part of the brain as large as a small hazel-nut into test-tubes with bouillon, and beside bouillon he also used various other culture media, and not in a single tube did he obtain a growth. Animals inoculated with this material proved negative, the same as in previous attempts, which would indicate that the infective agent was not in the material obtained from the affected animals and used in these experiments. I want to mention that in some instances cocci and diplococci were obtained in the growth, but they were not of pathogenic interest. In no instance were any results obtained from the inoculations, and surely not the characteristic disease which is described in this outbreak.

Dr. Roberts: Has anyone else anything to say along this line? If not, we will call on Dr. Kinsley to close the discussion.

Dr. Kinsley: Mr. Chairman and Gentlemen: I was sorry that the two preceding essayists and authorities on the program were not present. for it seems like the brunt of the whole situation has been placed on me.

In the first place, I suspect I have to make a statement that is covered in the paper as it will appear published. The report as I gave it was the outcome of the study of nearly 400 cases alive, and the autopsy of 38 or 39 cases. I appreciate the fact that the studies of a greater number would be of greater benefit, but the outbreak did not last long enough to make any further study in this particular instance.

In response to Dr. Reichel's inquiries I will say that I believe he will find in the published report a mention of the congestion of the esophagus and the cardiac portion of the stomach, also mention of the fact of the invasion of round cells, multiplication of the endothelial cells and some degeneration of the motor cells.

I did not quite catch the doctor's statement, but my paper is entitled, "Encephalomyelitis," indicating that the disease not only affects the brain but also the spinal cord. I think the Doctor criticised that. I believe that is covered in the title, as well as in the subject matter. His criticisms are well-taken, however, since they were not mentioned in the abstract which I read.

I will say in response to Dr. Ranck's inquiry, that I have not personally considered as this same condition cases of hydrocyanic acid poisoning. We usually think of that as a separate distinct condition. So in reference to the other type or condition he mentions, where there is extreme irritation of some part of the skin. I will say that I have seen three different outbreaks of that same condition. The last I saw was last spring on a pasture in Missouri, in which there was alsike clover, and in which there were several mules and horses, the mules being affected. These were young mules, yearlings, two-year-olds and a few three-year-olds. I have forgotten the exact number, but it seems to me, as I remember now, that there were about five cases in the twenty-four or twenty-five that were in the pasture of extreme irritability of the skin affecting the region around the mouth. These mules rubbed their lips. In one instance that I observed a mule walked along down the fence with his mouth open, just simply scratching the muscles of his mouth on that barb-wire fence, and you can imagine the extent of the lacerations. They would rub their nose, their head, and were extremely and extensively lacerated, but I believe only one died, and I believe it was secondary infection due to the laceration. The affected animals were tied under trees to a limb so they could not reach anything to further rub themselves.

I was interested in Dr. Schoenleber's statement about the contagion that appeared in the outbreak, and I would be still more interested had the Doctor gone on and told some of the reasons why he thought there was some evidence of contagion. And further, in response to Dr. Udall's statement, I was sorry the Doctor was not here, as I reported his conclusions from his investigation of this disease; and I will say that to some of us that investigated, we found so many striking instances in which the food appeared to contain the causative agent, that we could not draw the conclusions that he apparently has drawn.

Now to illustrate with a few examples. Between McCracken and Utica, Kansas, on the Missouri Pacific Railroad right of way, there were some eighty teams employed in regrading and finishing the roadbed. These horses were all fed in wagons, not allowed to graze except one team that was used for hauling water. In several instances the camps were adjacent. And I am thinking of one special place where the wagons were just inside of the railway right of way, separated by a wire fence. Near there was a barn in which three or four horses had died of this disease, and these horses that had died had consumed water from a tank that was supplying water to these railroad horses, and after the horses had died, then the railroad horses stood in the same stalls that these horses stood in, yet they never contracted the disease. They were fed different food. The horses that died had been on pasture; the railroad horses had obtained no food whatever except shipped-in cut feed or dry feed; and a team of horses of this same company that was doing the right of way grading and were allowed to graze where they obtained water, they both contracted the disease and died. None of the others died that were kept off the pasture. There were two pastures within about twenty miles of this location, and the disease was very prevalent in one pasture. From this pasture some 8 or 10 horses (I cannot recall just the exact number, it will be found in the report) were transferred over to pasture No. 2 containing over 100 horses, where the diseases had not appeared, and from pasture No. 2, 6 horses, I believe it was, were taken to pasture No. 1. Of those that were taken from the pasture where the disease had not occurred, 4 or 5 of them died of the disease in pasture No. 1 The disease never affected a single horse in No. 2 except several of those that were taken from pasture No. 1, in which the disease prevailed. Now of course that may be argument in favor of soil infection. I am not disputing that point, but I will say that if it is an infectious disease, it certainly is materially different from any infectious disease with which we as general veterinarians in the Middle West are familiar at this time.

There are many other things in this same relation that might be brought out, but all those of you who have inspected or investigated the disease, are quite familiar with it, and the others, I presume, are getting weary of the Kansas horse plague by this time.

I was interested in the report of the meningitis pasture and the cases down near New Orleans, and the statement made by, I think it was, Dr. Douglass, of the cases that appeared in town. I was wondering what the source of infection was. I will state that in the investigation of this outbreak in 1912 we were told time and time again that a certain animal had not consumed any grass, and had access to no pasture. When we would trace it down and get the exact truth, they would say, "Oh, yes, we let them out at noon," or "We had them out last Sunday on a picnic and turned them loose." But they did not consider that as grazing or obtaining any grass from the pasture land! Now I suspect there were a few cases that died of this disease that were never on the pasture land, but those cases, I suspect, if traced and known positively, obtained feed that was cut from these same lands. But I don't see as that would make any particular difference, whether they were fed feed from this land or grazed on the land. It summarizes itself in the same way.

I was interested in Dr. Eichhorn's report of what the Bureau of Animal Industry has done in relation to this investigation.

Now I want to leave my statements clearly with you in conclusion. I have not said this disease *is not* infectious. I say that, *if it is* infectious, it differs from other infectious diseases, and so far as I can read the work that has thus far been done, it has not been proved to be infectious.

Dr. Roberts: That closes our program of this afternoon. A motion to adjourn is in order.

Upon motion duly made and seconded, it was voted to adjourn.

Thursday Morning, September 4, 1913

The Section on Medicine participated in Symposium of Section on Sanitary Science and Police.

Friday Morning, September 5, 1913

Vice-President George H. Roberts in the Chair

Dr. Roberts: If we hear these papers this morning, we will have to begin. The first paper is by Dr. John F. DeVine, of Goshen, N. Y., on "Veterinary Science from the Country Practitioner's Viewpoint."

Dr. DeVine: Mr. President and Members: There is nothing in my paper of importance, and what little it does contain is general. There are some very important papers to be listened to, and I move you my paper be read by title and published. (Motion seconded and passed.)

VETERINARY SCIENCE FROM A COUNTRY PRACTITIONER'S VIEWPOINT

By J. F. DeVine
Goshen, N. Y.

At this time when mechanical devices are supplanting in so many ways the various duties that we previously asked our domestic animals to perform, the general aspect to the veterinary practitioner must necessarily be somewhat changed. This is particularly so with the class of men who have chosen the city as a place of practice. It is needless to attempt to enumerate all that the steam and electric railways and the automobile have done to supplant equine service in certain localities.

It seems but yesterday that the one subject that received most attention in the veterinary schools was the horse, and young men were wont to flock to cities where wealth made it possible to receive large fees, particularly in districts where the high-class carriage horse, the thoroughbred and the gentleman's roadster or trotter abounded. The owners of these animals were usually men of much wealth and were willing to pay liberally for skilful attention given to their animals. Those who have had experience in large city practices know full well that a veterinarian a decade ago might have been an equine specialist and carried on a lucrative practice in cities where his work consisted largely of examinations for soundness, lameness, green sickness, pulmonary affections and injured feet. Times have changed. The lavish expenditure upon the equine idol at such places as Saratoga and Sheepshead Bay in New York State and similar places in many other states is but a thing of memory. The heavy harness horse is now replaced by the limousine automobile; the electric auto and lighter cars are transporting and taking up the attention of the people who formerly were admirers and drivers of the lighter road horse; auto trucks are supplanting the draft horse, and it is plain to see that the future veterinarian must be capable of taking a more active part in agricultural and municipal matters, such as meat and milk inspection, and in general sanitary control work, with a view of guarding against the transmissibility to the human family of communicable diseases and the prevention and suppression of animal plagues the ravages of which, if allowed to take their course, would in all probability soon shatter the very foundation of that important factor of our nation's wealth, the live-stock industry.

In agricultural matters the veterinary practitioner today must not only be a practical horseman but he must meet the requirements of a broader term. He must be a practical stockman. His training should be so broad that his advice will be sought on feeding and dairying problems. He should be able to advise his rural clients as to the proper type of animals for breeding purposes, the proper nourishment for growing the young, or balanced rations for the greatest production in the adult. He should likewise be able to discuss intelligently such matters as rotation of crops, their relative nutritive value, etc.

Allowing that the horse is still possibly the most important factor to the general practitioner, we will need to wend our ways ruralward if we are to continue to attend to his needs. Statistics show that there are approximately 24,000,000 horses in the United States today and that about three-fourths of them are on the farms.

Lest it would appear from what I have said that the day of the horse's usefulness has passed and its value become unworthy of attention, let me remind you that perhaps there never has been a time in the history of our country when its value was greater, or its services more in demand.

While the evolution which we have cited has been going on, new avenues of occupation have been added to some of the old. While the price of trotter and the show horse is today, as in the past, governed largely by the quality of the individual and the wealth of the purchaser, the price of the draft horse and the general utility horse have steadily advanced. This has been augmented in a measure by the lack of supply of horses of a satisfactory type and quality, when horse breeding became unprofitable several years ago. Here again is where the veterinarian should be the guiding star of the breeder, and here is where proper stallion registration laws, at this time when horse breeding is sure to revive, would be of inestimable value to our country.

We as veterinarians should point out to the breeder the absolute necessity of selecting sires not only of a desirable strain but of a desirable individuality. Using a sire simply because he is eligible to registration, or possibly is registered, reminds me of an expression of a breeder of Holstein cattle. He said that some people in selecting a bull to head their herd would lay great stress upon getting a registered animal and that ordinarily that was about all that some of them did get. And added, "that some of the registered sires ought to have a certificate of burial rather than a certificate of registration."

The same holds good with our horse breeding: we want good blood lines and we want good individuals. In fact, a pure bred, defective animal is more dangerous than a scrub as he is far more apt to be prepotent and stamp his offspring with his defects. It is our plain duty, so far as we can, to assist in discouraging the breeding of animals with naturally vicious dispositions, particularly females; likewise animals of faulty conformation, such as narrow chests, long, washy barrels, defective feet, curby or beefy hocks or those suffering with hereditary spavins, ring bones and like unsoundnesses.

With the ever-increasing population of our cities and the systematizing of municipal governments, two comparatively new necessities have been added to the calling of the veterinary profession, namely, state and municipal meat and milk inspection.

The necessity and advantages of state and municipal meat inspection are daily receiving more and more attention. The public is beginning to grasp the fact that Federal inspection even with all its splendid system and force looks after only about 60 per cent. of the meat consumed by us, and that the greater part of this so inspected is for the protection of the other fellow and not for the small consumer who is at the mercy of the unscrupulous local butcher who may slaughter an animal suffering with any such dangerous or disgusting diseases as advanced tuberculosis, cancerous organs or extensive suppurative areas or the like. After stripping the diseased parts the remainder of the carcass is sold to the helpless consumer. It is truly a blessing to mankind that it is usually customary to subject meats to some form of cooking before eating under such conditions.

State and municipal meat inspection when conducted under capable veterinary supervision should excel Federal inspection, since in most cases it would be possible to carry out ante-mortem examination as well as post-mortem.

Meat inspection is truly a noble service, and the truism "He serves his own interests best who works for the common good of all," was never more applicable than in this work.

Milk Inspection

In certain Eastern countries, where babies are usually nursed by their mothers somewhat longer than in this country and are weaned gradually upon farinaceous and miscellaneous diet, they get along very nicely without the use of milk, but we have learned to look upon cow's milk as a most useful food for adults and practically a necessity for infants, particularly among classes where breast feeding is becoming undesirable or impossible. The wonderful merits of milk can only be realized when we understand that it contains all the elements necessary for growth and development in the young, and that it is the only single article of food which is complete enough in itself to sustain life for a very long period.

While normal milk drawn from a healthy cow and properly cared for is so valuable, still we have learned to know that diphtheria, scarlet fever, typhoid fever, tuberculosis and other diseases may be spread by milk, and that stale, warm and bacteria-laden milk is especially dangerous to young infants, and that some widespread epidemics which were formerly attributed to water, air and other causes are now found to be due to milk. As a noted writer has well put it: "To separate the mouth of the baby from the teat of the cow by several hundred miles is often a serious matter to the baby. Nature probably never intended the milk of one animal to be used by the young of another, but since it seems to have become a necessary custom with us, it has brought with it also the necessity of skilled supervision in order that it may be useful rather than harmful."

Cities are fast beginning to learn that even with their beautiful parks and boulevards, clean streets and similar ideal conditions the health question is only half solved. No city can remain healthy unless it takes into account the health of the country from which it obtains its food supply. It is interesting to note that at one time there was much more disease and much higher death rate in the city than in the country. The tables have now been turned, for there is less chance of contracting infection in the well-ordered city than in the average country place. For a long time people did not know how to live huddled together in large communities; fads and fancies ruled the day in matters hygienic; people partook of polluted water without a question.

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[1] Rosenau. "The Milk Question."

In fact it took them a long time to find out that the inexpressibly nasty habit of drinking water defiled with sewage was dangerous as well as not nice. Today our larger cities have a fairly satisfactory and clean water supply and the removal of waste is steadily showing improvement; but they must still get their milk from the country, and in many instances hundreds of miles away. For instance, New York City uses about one million six hundred thousand quarts of milk daily, and in order that this river of milk may reach the consumer in a palatable and nutritious form, it must be carefully guarded from the cow to the mouth of the consumer. In carrying out this protection our object should also be to enlighten and educate and not frighten. There is a temptation on the part of the popular exponents of science toward overstatement. This is not necessary. We will find that when all indictments are brought together that milk is criminal enough without any exaggeration. The great difference between milk and most other fluids is that bacteria tend to grow well in milk and die in other fluids adds to its seriousness if improperly handled.

We must not lose sight of the fact that the protection of our milk supply is like many other problems in preventive medicine. It lacks the dramatic effect. The rank and file of our people do not seem to grasp the fact that to prevent sickness and suffering is nobler than to administer in an unnecessary illness. We must disabuse the public's desire for glowing headlines in our public press as evidence of progress. It is common knowledge that tuberculosis exacts an annual toll greater than the number killed by bullets in the four years of our Civil War; yet compare the stir caused by this knowledge as to that caused by even the suggestion of war. The final solution of the milk problem will require mutual coöperation between the producer, the handler, the consumer and the inspector. The veterinarian by training and impartiality should play a very important part in the realm of adjustment and protection.

So much for the general condition of veterinary matters as we see them today. But there are still some other very important sides of our veterinary problems that are largely within our own command. I refer to the educational side, the interchanging of knowledge so to speak. I care not how skilled a practitioner may be, there are times when we will meet cases that are so wanting in true characteristics or so confusing in symptomatology as to make a definite diagnosis unwarranted and if we are conscientious men, as we should be, it is then that we turn to the man who by special training and equipment can assist us in solving the problem and make it possible for the practitioner to serve his community to a better advantage. I fear the general practitioner is not always as appreciative of the assistance he receives from laboratories as he should be, and I doubt if we have all done our share in assisting the laboratory man to be the greatest possible good.

When we stop to consider how absolutely helpless we ofttimes are when called upon to investigate an epizoötic or enzoötic presenting symptoms or characteristics with which we are not familiar, how we ofttimes have to grope aimlessly and hopelessly around in the dark. True it is that occasionally we may trace the cause of our trouble to some dietary error or local conditions, but more often we are apt to seek the assistance of the laboratory man either in determining the causing factor or giving us reasonable assurance that we are not dealing with a contagious plague. I think it can be truly said that most of us who err in giving assistance do so from lack of knowledge or carelessness rather than with any malicious intent. If for instance we should wish the brain of an animal examined owing to the fact that during life it exhibited certain nervous phenomena the cause of which we were not certain but had in mind the possibility of rabies, we should not expect the laboratory man to patch together a macerated hippocampus that had been mutilated by force. It would be still more hopeless to expect animal inoculation of the brain lesions to verify the microscopic work had putrefaction set in, or if disinfectants had been used as a preservative rather than cold temperature. These same principles hold true in sera diagnosing, the examination of organs, neoplasms and the like. The proper method in securing an organ or a tissue for examination and still further proper preservation of same until it reaches the laboratory will gladden the hearts of the laboratory man and bring to us more satisfactory answers.

The present outlook for the properly educated and trained veterinarian is as bright if not brighter than ever before. A little over half a century ago the number of educated veterinarians on this continent could have been counted on the fingers of one hand. The profession was then represented principally by graduates from foreign shores and a few so-called self-educated men, the latter who through their love for animals and interest in the alleviation of suffering, made a special effort to administer to the dumb brutes as intelligently as their knowledge acquired by books and experience could warrant. We have nothing but praise for our older graduates and the honest, well-meaning non-graduates, but we must likewise admit that our profession at that time was overwhelmingly represented by the type of men, pitifully wanting in ability and conscience. I remember as a youth looking on with boyish terror at the cruel barbaric treatment our stock was subjected to from time to time. It is not a matter of ancient history when the self-exploited veterinarian bored holes in the cow's horn and filled them with turpentine, or poured melted lard in the poor, suffering animal's ears after a wise diagnosis of horn distemper. Similar cruel treatment was sure to be the lot of the animal that through illness of any kind showed a flaccid condition of the tail, when a jack-knife would be sharpened on the bootleg, the tail split and the opening filled with pepper and salt which would make the animal squirm and thereby show evidence of great and suddenly reviving life. We should rejoice that the days of empiricism are passing. The public recognizing the necessity of a scientific administration to the dumb brutes similar to that being administered toward the alleviation of pain and suffering in the human family, encouraged the fathers of veterinary medicine in this country and these good men withstanding all the trials and vicissitudes, scorn and criticisms that were cast upon them, slowly through their sincere efforts brought up the standard of the veterinary profession until today it is looked upon in most states as the equal in every way to other professions such as medicine and law. Young men of refinement and education have been induced to enter the profession. Veterinary schools of magnificent type are being built, where an education quite in keeping with that of any other profession is available for veterinary students. As our veterinary profession has grown, associations and membership have multiplied until today nearly every state, territory and province in this country can boast of one or more veterinary associations.

Veterinary Societies

All veterinarians should support and take active interest in veterinary associations; they first, last and always stand for better education and better organization, to the end that we may better serve mankind, the brute creation and the live-stock industries of our country.

Veterinary societies are a benefit to every veterinarian, I care not whether he be a specialist or a general practitioner; the very atmosphere of these gatherings is pregnant with knowledge and suggestions that are sure to develop a thought or clear a problem that heretofore never occurred to us or on which possibly our knowledge had been too meager to be of any value to us.

While I have said but little concerning general practice, this in my judgment is perhaps the most important branch of veterinary science.

I have the greatest respect for the chemist, bacteriologist, and biologist. Without them I fear that medicine and veterinary medicine would stand still or make progress discouragingly slow. Think of the evolution in the practice of medicine that these men have brought about. The future limit of serum therapy, antitoxins, phylacogens and vaccines no man dare predict, but again we must not lose sight of the fact that the practitioner is the man who must make use of and apply this and like knowledge if these preparations are to reach the fields that they were primarily intended for. Expert knowledge kept in laboratories or experiment stations would do the world at large but little good.

In conclusion it is my judgment that veterinary education is in the era of ascendency, and if we are to continue to make progress it behooves us to be thorough students in all matters pertaining to the class of work in which we are laboring. Honesty with ourselves and our clients, our work and our results, are good watchwords for the onward march of the profession that each member should support and add to its usefulness.

Dr. Roberts: The next paper is by Dr. R. A. Archibald, of Oakland, Cal. "A Preliminary Report on the Value of Leukocytic Extract from a Therapeutic Standpoint." If there are no objections we will hear Dr. Turner, as he is very anxious to get away, and says his paper is short, until Dr. Archibald comes in. "Some Phases of Necrobacillosis in Cattle Practice" by John P. Turner, Washington, D. C.

SOME PHASES OF NECROBACILLOSIS IN CATTLE PRACTICE

By John P. Turner
Washington, D. C.

The attention of American veterinarians was called to the serious inroads on animal industry of the Bacillus necrophorus by the admirable bulletin of Mohler and Morse entitled "The Bacillus Necrophorus and its Economic Importance," B. A. I. Circular 91, 1906, in which they describe the many diseases in all domestic and many wild animals caused by this anaërobe.

A large number of diseases under divers names have in common, as the causative agent, this bacillus, whose multiplication and activities in the tissue, always cause the same pathological condition: necrosis.

In practice, the veterinarian daily meets with this condition whether it be a case of cartilaginous quittor, skin quittor, necrotic stomatitis of young calves, sore mouths in pigs and in certain forms of foot rot of cows and sheep and navel ill of calves. In all of these diseases there must exist some solution of continuity in the tissue involved caused by mechanical injury or physical change whereby this bacillus gains entrance in the healthy tissue and is responsible for the pathologic changes occuring therein.

All of these conditions are so familiar to the general practitioner, that the writer will not further discuss these diseases or their treatment, but will proceed with those phases which to him seem more interesting and especially to one which seems to have been overlooked by many authors describing necrobacillosis and its various forms. The two phases herein described occurred in a large herd of Holstein-Fresian cows in the District of Columbia during 1911, 1912, and 1913.

This herd is maintained under model conditions as to cleanliness of barns and premises; in fact, it is a show place; but nevertheless conditions obtain which seem to favor necrobacillosis. I allude to the congestion of animals in a limited area. The cows have a fair amount of pasture but entirely too little for maintenance, and are therefore fed soiling crops throughout the year. The calves are kept in sanitary stalls but have a grass runway which has been in continuous use for fifteen years.

These conditions are given because they explain to a large degree why this disease is more frequently observed in animals kept under sanitary conditions but with more or less congestion. Veterinarians who practise in zoölogical gardens are quite familiar with the inroads of this disease among wild animals kept in clean quarters but in restricted areas, where, in spite of clean pens and clean yards, necrobacillosis appears at irregular periods due to soil infection. Mettam (*Vet. Record*, Sept. 17, 1910), cites a case in which a kangaroo died of necrobacillosis, showing stomach lesions which penetrated the walls of the stomach, causing peritonitis.

The average stock grower, while not knowing the exact cause of his losses, has learned from practical experience, that the successful raising of young cattle demands an extensive range for feeding.

In the fall of 1910 several calves developed symptoms of an atypical nature but mainly of a nervous character. A calf would suddenly become almost blind and would grope around aimlessly; this would be followed by a series of nervous phenomena. These symptoms which in many ways resembled those observed in hemorrhagic septicemia, would last from twelve to forty-eight hours, when death would ensue, irrespective of any treatment. Post-mortem examination of the first few calves showed nothing of diagnostic value other than hemorrhages of various sizes on the heart. An examination of the gastro-intestinal tract was made but the various organs were not opened. When the next calf died with similar symptoms, the aid of the Bureau of Animal Industry was invoked and post-mortem examination held in Dr. Mohler's laboratory revealed, besides the hemorrhages on the heart, denudation of the epithelium of the rumen with areas of grayish necrotic patches. The reticulum was but slightly inflamed. The omasum showed many elevated caseo-necrotic ulcers and patches. The abomasum and intestines showed inflammatory changes. The heart and pericardium showed hemorrhagic spots. Smears made from the necrotic areas in the rumen and omasum showed practically pure cultures of the necrophorus bacillus in their characteristic form. These findings were substantiated by inoculations. Smears and inoculations from the heart, failed to show these or other organisms. A large number of calves in this herd have shown necrotic infections of various kinds in addition to the intestinal forms. Necrotic sore mouth has been very prevalent usually at the period of dentition of the temporary molars and would be noted by the appearance of a pouched cheek. Strings of saliva would frequently hang from the mouth. Examination showed a necrotic area in the cheek opposite the molar teeth and the pouch to be caused by an accumulation of partially masticated food lodged between the jaw and the necrotic area on the cheek. Mettam records similar cases with lesion on the tongue and in the rumen among calves two weeks old (*Vet. Record*, Sept. 17, 1910).

During the past year the disease has been held in check by such prophylactic means as applying air-slaked lime to the calf yards, plowing them deeply and allowing the earth to rest for several months before any reseeding. The calves in the meantime were removed to a larger pasture where they had a fair range. The calf stables are disinfected weekly and all feeding buckets are sterilized daily.

During the winter of 1910 the writer's attention was called to a peculiar ulcerative disease affecting the distal end of the tail of a Holstein-Fresian bull on the same farm. This bull is almost entirely white and was in rather high condition. He was stabled in a large box stall and had a gravel runway 25 feet by 75 feet. His feed was bran, oil-cake meal and clover hay, and was rather a narrow ration. He was exercised one hour daily on a tread mill, his labor being utilized to grind beets for the dairy herd. The condition of the distal end of his tail was very similar to impetiginous eczema and was so treated by the writer, the cause being thought to be due to the tail rubbing a bar used on the rear of the tread mill to prevent him from extending himself too much in the machine.

However, the disease continued to spread until it involved one-half of the tail, even when the apparent cause was discontinued and in spite of all treatment.

The distal end first showed purple petechial spots about the size of a pea. This would develop into an ulcer with the formation of a hard scab.

When scraped these ulcers showed a deep necrosis extending almost to the caudal vertebra. This distal end of the tail became greatly hypertrophied and naked.

After resorting to several lines of treatment the disease gradually disappeared with the abatement of cold weather.

The following winter (1911–12) this disease reappeared in a much more violent form in this bull and in a yearling bull just purchased.

The tail of the older bull became hypertrophied to several times its normal thickness and lost its switch as well as most of the short hair. The younger bull developed a similar condition save that the distal end of the tail became very necrotic and almost sloughed off.

The necrosis in these tails became so resistant to ordinary treatment that the writer called Dr. John R. Mohler into consultation. Dr. Mohler diagnosed these cases as necrobacillosis.

This disease reappeared on this farm in the winter of 1912–13 among the yearling heifers on the same farm, but in a very mild form. So many heifers were affected that a study was made of their care, feeding, etc.

It was discovered that the attendant in charge of these heifers had been in the habit of washing their tails in a bucket of hot, soapy water, and without drying them the heifers were turned into the pastures on cold winter mornings.

This practice resulted in a severe chapping of the skin of the tail through which entered the bacillus necrophorus and began its destructive work. It was then ascertained that this practice had been in vogue by the attendant having the bulls in charge so that the same primary cause can be ascribed to both outbreaks. This disease did not appear among the milch cows, where the practice is to thoroughly brush the tails daily with only an occasional washing when the tails become badly stained.

The ordinary treatment with hydrogen peroxide, carbolic acid and iodine were of little avail in the worst cases. After using several lines of treatment, the writer found that a thorough cleaning with hydrogen peroxide followed by deep cauterization of each ulcer with silver nitrate crystals and following this by washing the entire tail with 15 per cent. silver nitrate solution was most efficacious.

Dr. Roberts: Dr. Turner's paper is open for discussion. Has anyone anything to say on Dr. Turner's paper? If not, we will hear from Dr. R. A. Archibald, "A Preliminary Report on the Value of Leukocytic Extract from a Therapeutic Standpoint."

A PRELIMINARY REPORT ON THE VALUE OF LEUKOCYTIC EXTRACT FROM A THERAPEUTIC STANDPOINT

By R. A. Archibald
Oakland, Cal.

Subsequent to the publication of an article in the *Journal of Medical Research,* June, 1911, vol. xxiv, No. 3, by Hans Zinsser, Geo. W. McCoy, and C. W. Chapin, on the "Protective Influence of Leukocytic Substances upon Experimental Plague," the writer conceived the idea that if leukocytic substances could be obtained in sufficient quantities to be not only therapeutically practical but commercially possible, that a decided step forward would be made in the biological treatment of infectious diseases.

Prior to the publication of the above-mentioned article, Hiss and Zinsser (*Journal of Medical Research,* 1908, vol. xiv, No. 3, and vol. xv, No. 3, 1909), demonstrated in an experimental way that leukocytic extracts could be prepared by injecting into the pleural cavities of rabbits, 10 c.c. of a meat extract broth containing 3 per cent. starch and 5 per cent. aleuronat. At the end of twenty-four hours a copious and very cellular exudate will have accumulated in the pleural cavities. This is obtained by killing the rabbits and removing the exudate, which is immediately centrifuged. The leukocytic sediment is diluted with twenty volumes of sterile distilled water to one volume of sediment, and autodigestion is permitted to take place in the incubator following which the extract is stored in a refrigerator until used.

In experimenting with animals, Hiss and Zinsser observed that pneumococcus, staphylococcus, streptococcus, meningococcus, typhoid, dysentery, and cholera infections in rabbits and guinea-pigs were profoundly modified when injections of leukocytic extracts prepared as above described were administered intraperitoneally or subcutaneously during the course of the infection. In many cases, animals were saved by these substances from infections which próved rapidly fatal in untreated control animals, even when the protective injections were made as late as twenty-four hours after intravenous infections.

In applying this method of treatment by subcutaneous injections to infections in man, Hiss and Zinsser observed distinctly beneficial results in cases of epidemic cerebrospinal meningitis, lobar pneumonia, staphylococcus infections and erysipelas.

Hiss and Zinsser's idea was that injecting into infected subjects the substances composing the cells usually found in exudates in a diffusible form, that such substances would, following absorption, relieve or stimulate the fatigued leukocytes.

Later, Zinsser, assisted by McCoy and Chapin, conducted a series of experiments on white rats with a view to ascertaining whether substances obtained from normal leukocytes would modify in any way the course of experimental infection with the *Bacillus pestis.* As the result of their experiments these workers found that the use of emulsions of normal leukocytic substances obtained from rabbits exerted a distinctly protective influence even when such substances were administered twenty-four hours after the inoculation of rabbits with virulent plague organisms.

While the results obtained by the above mentioned investigators were intensely interesting from a practical standpoint, their methods of obtaining leukocytic substances must be considered as having little value, as the injection of a proteid substance into the pleural cavities of rabbits yields such a small amount of leukocytic substance as to rob it of much value from a therapeutic standpoint.

For the purpose of throwing some light upon the nature of bactericidal substances in leukocytic extract, Wilfred H. Manwaring (*Journal of Experimental Medicine,* September, 1912, vol. xvi, No. 3) conducted a series of experiments. Manwaring started out with the assumption that there exists powerful bacteriolytic substances within the cytoplasm of certain body cells, and that this fact is amply demonstrated in the automatic sterilization of old abscess cavities and the sterilizing of the pneumonic lung, which is assumed to be due to the liberation of endolysins the result of cellular disintegration. His work was with a view of extending the present knowledge of these lytic substances, and to determine the approximate chemical nature of the bacteriolytic substances that might be extracted from leukocytes.

In obtaining leukocytes for these experiments, Manwaring at first followed the practice of injecting rabbits with a 5 per cent. suspension of aleuronat into the pleural cavity, but he found that he was decidedly handicapped in his study of the nature of the extract so obtained, on account of the small amount of substance available. By injecting aleuronat into the pleural cavity of a rabbit, one seldom secured more than a single cubic centimeter of leukocytes. In order to overcome this obstacle, he selected the horse for the continuation of his work. His treatment consisted in injecting into the pleural cavity of the horse from 300 to 500 c.c. of a 5 per cent. aleuronat in 2 per cent. starch paste solution, the starch being added to aid in holding the aleuronat in suspension. Following such an injection there are usually found from one to three liters of pleural exudate daily for the first week, the yield then decreases, and usually ceases entirely about the fifteenth day. The exudate contains about 5 per cent. of leukocytes. Manwaring's experiments show that while the extraction of a bacterial substance from leukocytes is attended with considerable difficulty, still he was enabled to demonstrate that it could be done by carefully observed technique. Manwaring, while not being able to arrive at a final conclusion as to the nature of the bactericidal substances in leukocytic extracts, did reach the logical conclusion as the results of his investigations, that the bactericidal substance present is probably an enzyme.

About this time Jobling and Strouse (*Journal of Experimental Medicine*, September, 1912, vol. xvi, No. 3) published an article on their "Studies of the Extent of Leukocytic Proteolysis." These investigators used in their experiments, leukocytes obtained from inflammatory pus, also fresh dog leukocytes obtained by pleural cavity injections of aleuronat.

Their conclusions were, that the proteolytic action of leukocytes is a readily established fact, and that this action depends upon the presence of two proteases, one capable of acting in an alkaline, and the other in an acid medium, with possibly a creptic ferment which is apparently capable of acting in either an acid or alkaline medium.

We could, did circumstances permit, go on and recount the results obtained by other investigators, showing that leukocytes do contain intracellular substances which possess proteolytic properties, but from a study of the question from a therapeutic standpoint the result obtained by later investigators, and the personal work of the writer, and his co-workers indicate that the proteolytic action brought about by the parenteral injection of leukocytic substances, does not influence in a marked degree the progress of an infectious disease. The writer was able to demonstrate *in vitro* bacteriolytic properties in leukocytic extract produced by the method advised by him, but he long ago reached the conclusion that such bacteriolytic powers were not sufficient to account for the profound changes actually produced in animals suffering from bacterial diseases while undergoing a course of treatment by the parenteral injection of leukocytic substances. For the reason of these profound changes, we must look elsewhere than to the direct lytic action upon the invading bacteria.

As the result of experimental blood counts and tests made, and being made, we believe that the great therapeutic benefits derived depend upon the production of a hyper-leukocytosis, and attendant phagocytosis rather than upon any direct action of the leukocytic extract itself.

It is a well established fact that the parenteral injection of protein substances increases the leukocytic count, and even the injection of foreign vegetable proteins, such as nuclein preparations, produce in many infections marked beneficial effects. It would seem, however, in carrying out leukocytotherapy, that in order to produce a hyperleukocytosis without unnecessary strain upon the organism that it is eminently more logical for the organism to care for parenteral injections of substances similar to its own elements than to any elements which are of an alien character.

It is also a well established fact that in the treatment of diseases any method that will stimulate the leukocytic-producing organs to more active functioning, thereby producing a leukocytosis, is and must of necessity be of positive benefit. The great problem before us then in this connection is to ascertain the simplest and most innocent means of accomplishing this end.

About the beginning of the year 1911, the writer instituted a series of experiments with a view of obtaining leukocytic substances in quantities that would render them not only therapeutically practical, but also commercially possible. The general plan adopted was the obtaining of leukocytes directly from the blood of normal animals, avoiding any changes in their character, as might be possible during the process. It would be obviously impossible for us with the time at our disposal to go into detail as to the various methods instituted to bring about this. Suffice it to say that after much experimental work had been done, the following general technique was adopted. The blood, obtained under aseptic precautions from the jugular vein of a horse or other domestic animal, is allowed to flow into sterile flasks containing a sufficient quantity of a 1 per cent. sodium citrate solution to prevent coagulation. The blood is then centrifuged, the serum and citrate solution is siphoned off, and the corpuscles are treated with a five-tenths of 1 per cent. solution of acetic acid and again centrifuged. This process is repeated several times until the red blood corpuscles are eliminated. The leukocytes are then washed with physiologic salt solution three or four times to remove most if not all trace of the acetic acid, after which they are ground in a mortar with quartz sand. To the washed and ground leukocytes is then added about five volumes of sterile distilled water to one volume of leukocytes. This mixture is exposed to a temperature of 58° C. for one hour, when it is placed in the incubator for a period of twelve hours, and again exposed to a temperature of 58° C. for one hour. This process of exposure to different temperatures is continued for two or three days, or until autodigestion is complete. It is then centrifuged, the supernatant fluid decanted, and sufficient trikresol added for preservative purposes.

As to the changes produced following the parenteral injections of the above described preparation, will state that we do not propose to enter into at this time, a long technical description of the various experiments instituted and being instituted for the purpose of throwing some light upon the action brought about by injection of leukocytic substances. In conjunction with Dr. Gertrude Moore, to whom I am deeply indebted, for kindly consenting to help in this work, the results of our investigations along these lines we hope will be published in some scientific journal in the near future. We will simply state at this time that the use of leukocytic substances parenterally injected gives rise to a marked leukocytosis accompanied by profound changes in the leukocytes themselves. You will please pardon us, however, if we briefly give the results of one experiment, which will serve to bear out the statement above made.

Following the subcutaneous injection of 2 c.c. of leukocytic extract obtained from horses' blood, into a rabbit, the blood changes were observed at frequent intervals for a period of thirty-six hours.

The injections were made at 9 A.M. At 10.30 A.M. a marked leukopenia was observed which was followed by a leukocytosis, which reached its maximum at 3 P.M. of the same day. The leukocytic count then dropped slightly above the normal at midnight, when another upward curve was observed, which reached its maximum at 2 P.M. the day following. This was followed by a gradual decrease to near the normal. It will be interesting to note that two distinct curves occurred in the total leukocyte count within the period of thirty-six hours, at the end of which time the count showed a tendency to persist at a point about 100 per cent. above the normal. While the total leukocyte counts were intensely interesting, the differential counts were infinitely more so. The polymorphonuclear neutrophiles increased about 100 per cent., the small mononuclears decreased about 100 per cent., the large mononuclears decreased about 25 per cent., while the eosinophiles increased about 800 per cent. In all our experiments we found that there occurred a marked eosinophilia. In fact, in one rabbit the eosinophiles showed by differential count $44\frac{2}{3}$ per cent. of the total count.

Much study has been given to blood pictures in this connection, according to the methods of Arneth, who, you no doubt are aware, claims to be able to estimate the resisting power of an individual by a differential count of the polymorphonuclear neutrophiles with respect to the number of their nuclei. Arneth claims that in cases with low resisting power, there is a preponderance of cells with one nucleus, while in cases with good resisting power, the percentage of leukocytes with from 3 to 4 or 5 nuclei is increased. It is too soon, and we are not yet prepared to interpret the probable significance of the profound changes that were observed, and we crave your indulgence to defer offering any opinion on this phase of the question to a later date. These brief notes of some of the changes observed are simply made at this time to demonstrate that in the study of the action, following the parenteral injection of leukocytic substances, we must conclude that the changes produced are of intense interest, and will require much more thought and study before an interpretation of the results produced is even attempted.

Experiments are already under way to determine the different effects, if any, following the parenteral injection of leukocytic substances obtained from various animals into a series of animals of the same species, with a view of ascertaining whether an extract from a different species will give rise to the same changes as an extract from the same species. Manoukhine and other Russian workers have in the treatment of pneumonias and other infections used leukocytes taken from the patient's own blood, and claim to have had splendid results; but whether future investigations will solve the problem as to whether more benefit may be derived from the use of an individual's own leukocytes, the leukocytes of another individual of the same species, or the leukocytes of an individual of a different species, is yet to be determined.

Another vital question that requires investigation is to determine whether leukocytic substances obtained from a hyperimmunized animal possess specific therapeutic powers. Practically no research has been conducted along these lines, but what little work has been performed tends to demonstrate that a leukocytic extract obtained from a hyperimmunized animal differs in no respect from that obtained from a susceptible animal.

The practical therapeutic application of leukocytic extracts has been followed out during the past year, not only in our own practice, but also by other practitioners. Various infections have been treated with, in some types of infections, encouraging results, while in others the beneficial results were not so marked.

The diseases to which the treatment has been applied, and which have given the most gratifying results are such infections as purpura, influenza, pneumonia, distemper in dogs, etc. In the case of purpura, the agent seems to be, if you will permit us to use the term, a specific. In such cases, about the third day following the daily injections of the extract, the swellings, no matter how marked, disappear from the extremities, and the mucous membranes clear up. In fact all the characteristic clinical manifestations of toxemia incidental to this infection disappear, and the animal makes an uneventful recovery in from ten days to two weeks. Apparently hopeless cases of purpura make nice recoveries following the daily intratracheal injections of the extract. The extract is administered in daily doses of from 7 to 10 c.c. intratracheally. It is given intratracheally for the reason that when given subcutaneously, it was found to cause intense swellings, which, while giving rise to no unpleasant sequelæ, having a tendency to alarm owners or attendants. Just why marked swelling follows the subcutaneous injection of the extract we are not prepared to state, but it is possible that on account of the slight acid reaction possessed by the extract, a so-called acidosis is produced with an accompanying edema.

In conclusion, we hope to be pardoned for touching so superficially upon the various phases of this subject, but the problem possesses such magnitude, that it is obviously impossible, during the limited time at our disposal, to go deeper into the subject matter at this time. Our only excuse for presenting the matter in such a crude manner, is that perhaps other laboratorians may be stimulated to take up the work, and that as a result of investigation by a number of individuals working independently, a therapeutic remedy of positive value for the alleviation of human and animal suffering will eventually be produced.

Dr. Archibald: Since writing this paper an article by Hiss appeared in *The Journal of Medical Research*, No. 28, vol. cxxxiii, published in July, 1913, which gives the results of his experience in the use of leukocytic extract in the treatment of diseases in human beings, and those of you who read that will find that it is very interesting. Certainly, Hiss has obtained splendid results. Take it for instance in the case of erysipelas in the human family, that is, in children under five years of age. He has reduced the mortality in cases treated by him to below 50 per cent. Those of you who know anything about erysipelas in young children know that the mortality is very, very great. It seems that everything points to the fact that leukocytic extract is particularly effective in the treatment of diseases due to streptococci infection.

Dr. Roberts: Dr. Archibald's excellent paper is now open for discussion if anyone wants to say anything on this subject.

Dr. Turner: Mr. President, I would like to ask Dr. Archibald if the leukocytic extract that he used on purpura cases was from infected animals or from normal animals?

Dr. Archibald: The extract we used on all our purpura cases was taken from the normal animal.

Dr. Eichhorn: I certainly listened with the greatest of interest to the paper of Dr. Archibald, as it has taken up a subject which will probably in the future play an important part in the treatment of infectious diseases. Ever since the work was commenced in experimenting with leukocytic extracts, I have had a great deal of faith that the results will eventually be such that in the treatment of infectious diseases leukocytic extracts will be utilized probably to a greater extent than bacterial vaccines which are now so extensively employed.

I am glad that Dr. Archibald designated his article as a stimulus toward extending that work to other laboratories, as the subject is of such magnitude that it certainly will require a great many investigations and investigators before all the details of this leukocytic extract will be fully worked out for therapeutic purposes. I, myself, would have undertaken work in this line, and Dr. Mohler and I have discussed it, but we have been so pressed with other kinds of experimental work that we have not had the opportunity as yet.

Dr. Fox: Mr. Chairman. From the practical standpoint I might be able to add a word here in relation to leukocytic extract that has been produced by Dr. Archibald from time to time. Living in practically the same neighborhood, that is, by that I mean in the same state, it is possible for me to procure this extract from Dr. Archibald's laboratory directly. I have had occasion to use it several times; in fact, I don't know how many times, but probably, I have used it twenty times in the last few months in different cases of infectious pneumonia and cases of distemper in dogs, and also in purpura hemorrhagica. I am very pleased to say that I have had very good results in nearly all of the cases I have treated. I used it especially, or more especially, I might say, in the case of purpura hemorrhagica. And if you would permit me the time I would just like to say a word about one case of purpura hemorrhagica that I treated. It was a young colt probably sixteen or seventeen months old, with a most typical case of the disease that it has been my pleasure to observe for a number of years. His legs were swollen to such an extent that he could hardly walk. The legs were sloughing around the lower extremities to such an extent that the flies were following him across the field; when he attempted to walk to the stable we had hard work to get him to move that far. In fact, he was so sore and so much emaciated and run down from the disease that it seemed he could hardly get in. I had heard the day before that in all probability this was a case of purpura hemorrhagica from the telephone message I received from the owner, and so I immediately telephoned to Dr. Archibald to send leukocytic extract, and I took it with me when I made the visit. I gave him 10 c.c. of the leukocytic extract, and I told the man on the following day to give him 10 c.c. in the same manner.

On the second day the swellings were about the same, but the colt was very much brighter in appearance; he seemed inclined to eat and looked very much brighter generally. On the third day the swellings began to disappear, and from that time on I think we gave him about seven doses, that is, treated him for seven days as described for the first two days, and at the end of that time there was nothing the matter with the colt except that the erosions on the legs where the skin had sloughed away had to be treated as simple wounds. I treated them with antiseptic treatment and the colt made a splendid recovery. I have had other cases that gave equally good results.

Dr. McInnes: That was the only treatment you gave the colt?

Dr. Fox: That was the only treatment: nothing else in the world except leukocytic extract.

Dr. McInnes: Dr. Archibald mentioned his treatment as very good for distemper in dogs. I would like to ask if he has ever had any experience with the treatment?

I have treated a great many dogs with distemper, probably all the profession have, and I have had no success in treating distemper in dogs at all, they all died. I have used all those commercial antitoxins, and they are no good at all, as curative agents.

Dr. Archibald: We have treated a few cases of distemper in dogs, and I think in many cases with very gratifying results. I first started to treat dogs with leukocytic extract obtained from other animals. In the last few months we used leukocytic extract obtained from the dog blood, and we think we are getting good results. We have not treated a sufficient number of cases to draw any conclusions, and I only speak of the matter in a general way. I do not believe in making definite statements until you know just exactly what you are talking about; but we are going to continue the treatment of distemper with leukocytic extract, because we believe we are going to get good results from it. There are some features about the use of leukocytic extract in cases of distemper that requires some considerable investigation and study. One case in particular that I saw a week or two before I left home was a case of distemper that came down with a very virulent type, a very active case, and apparently the leukocytic extract did more harm than good; that is, it seemed to increase the intoxication. In fact, that is one of the actions that we frequently see in the use of leukocytic extract, that the first dose or two seems to increase the intoxication rather than diminish it, but the third day, if the intoxication is not carried too far, the condition will improve.

Another case of distemper treated exactly at the same time with the same conditions showed some indications of increased toxemia for the first two days, and on the third day commenced to pick up and recovered without any further trouble.

Dr. Leech: Mr. Chairman, I would like to ask a question: At what stage, Dr. Archibald, do you recommend injecting leukocytic extract, or giving it to a dog? I did not hear the paper, but I am interested slightly in this distemper question?

Dr. Archibald: I think the leukocytic extract can be administered in any stage providing that the toxemia or toxic condition is not marked. If the toxic condition is very marked, then the question of the advisability of using leukocytic extract is debatable, depending upon the condition.

Dr. Leech: You would not recommend the use of leukocytic extract in case of incoördination and cerebritis?

Dr. Archibald: When you have those profound symptoms indicating profound toxemia, then I doubt the benefit to be derived from the application of leukocytic extract, because I believe that the introduction of the leukocytic extract increases that condition and aggravates it. I think, so far as we have gone in our investigation, that the action of leukocytic extract is that it increases the power on the part of the leukocytes to destroy and break up the bacteria or invading organisms, and in doing so it liberates the antitoxic elements contained within the invading organism.

Dr. Leech: You would not recommend, then, the introduction of leukocytic extract, as I understand this discussion now, into a dog in case of distemper where there had been a sufficient toxemia to overcome the normal blood pressure?

Dr. Archibald: No, I would not.

Dr. Roberts: Anything further? If not, we will pass on to the next paper, "Artificial Insemination and its Relation to the Veterinarian," by Dr. F. F. Brown of Kansas City.

ARTIFICIAL INSEMINATION AND ITS RELATION TO THE VETERINARIAN

By F. F. Brown
Kansas City, Mo.

The merits of artificial insemination of animals have been given but very little attention by the veterinary profession as a whole. Until recently this method of impregnating animals has never been utilized in a general way but has been restricted to a limited number of valuable females having some congenital defect or pathologic condition.

Perhaps one of the greatest reasons for lack of interest in this subject on the part of veterinarians is their lack of knowledge or appreciation of the practical adaptability of the method to daily breeding operations.

Doubtless the schools engaged in teaching veterinary science are in a great measure responsible for this lack of knowledge. The individuals composing the faculties are not ordinarily engaged in active practice in breeding districts, so that the importance of this method has not fully impressed them.

It is to be regretted that students and graduates go from the doors of our colleges uninformed on this important branch of veterinary science. I seriously question if there is a single standard school that gives the subject more than passing notice and perhaps then with the impression that it is only of experimental interest.

With the belief that our profession is not fully awake to the importance of this subject the writer has been prompted to the preparation of this paper.

Progress is being rapidly made, in this work not by veterinarians, but by laymen, and it should not be for us to stand idly by and see ourselves outstripped by men untrained in a branch of work that is properly ours.

Laymen have developed the practice of artificial insemination to a point where it has been placed upon a practicable basis and may be generally utilized in daily breeding operations in the equine. By experience the stallioner has learned that the services of this animal may be extended many fold by this method, and that the energies of the sire may be conserved and not overtaxed and that the number of progeny possible from a sire during his lifetime is almost incalculable.

Relying upon the physiologic fact that but a single spermatozoön is necessary for successful fecundation, and that hundreds of thousands are lost at each service, it suggests itself to the thinking man that numerous divisions may be made so that several mares may be bred just as effectively as the usual single individual.

The technique must surely be simple if laymen with but little training can practise this method successfully. Observance of cleanliness with attention to proper temperature and avoidance of exposure to bright sunlight are some of the requisites for success.

Artificial insemination in the hands of careful observing men is rapidly becoming an important commercial proposition. No man can predict its influence on the future production of animals.

A statement can only be made of what is already being accomplished with a hint as to its possibilities for the future.

These statements are based upon personal experience and extensive inquiries made to reputable breeders engaged in practising artificial insemination from one to five years. I have in my possession upward of 160 letters from breeders in answer to questions submitted to them and from the various sources of information the following conclusions have been reached concerning the advantages of artificial insemination over natural service.

1. Stallion owners are able to restrict the services of their animals to one period a day, thus conserving the virility of the sire and contributing to more vigorous offspring.

2. By effecting a division of the semen from 7 to 18 mares may be easily bred from a single service.

3. That a higher percentage of foals results for the reason that insemination is certain and the stallioner soon learns to detect and reject mares showing evidence of confirmed sterility.

4. That impregnation is far more certain in cases of atresia of the cervix, a tortuous or elongated cervical canal, together with various pathologic conditions of the vaginal tract and numerous other conditions.

5. The opportunity for conveying contagious or infectious genital diseases is greatly lessened and reduced to the minimum by the observing operator.

6. That the opportunity for physical injuries to either stallion or mare is practically *nil* by this method.

7. That the offspring are equal to and generally should be superior to the natural product on account of the sire not being overtaxed.

8. That the results obtained justify the stallioner reducing the service fee if necessary, making it no excuse for any man to breed to a scrub and putting the latter out of existence through competition alone.

9. That certain shy breeding mares may be bred successfully at the termination of the estral period and in the hands of several experienced men impregnations have been accomplished by breeding at any period without regard to estrum.

10. That with proper care semen may be transported distances and impregnations successfully made.

11. That cheap females may be utilized as in case of the burro which when crossed with a horse of proper type results in a hinny that finds a ready market at a remunerative figure.

Breeders report that by this method they are able to breed daily all the mares that are presented and several have reported breeding nearly 300 to one sire during the season, with the comment that they could have bred twice the number.

The man who interests himself in artificial insemination will naturally become a student of those conditions responsible for sterility, some of which he may be able to overcome, and others he will reject, thus giving rise to a higher percentage of foals. Instead of the usual 50 or 60 per cent. careful breeders are getting 80 to 90 per cent. and even better by this method. A breeder in charge of a large establishment reports that in 1912 he rejected 136, and in 1913, 231 mares as unsuited for breeding on account of clinical evidence of confirmed sterility.

The yearly losses to mare owners that accrue from sterility are enormous.

Many of these cases are victims of genital diseases capable of being transmitted by coition. An examination of the discharges from the uterus of a certain class of sterile mares will reveal a peculiar organism that is capable in cultures of very promptly destroying the life of spermatozoa. The same statement will apply to the discharge itself. Infectious abortion is unquestionably disseminated through the act of coition and this disease is assuming alarming proportions in some localities.

Every public breeding establishment is in a sense a menace to animal health through the spread of communicable diseases of a genital character, and the owners of these establishments bear a certain relationship and responsibility to the public. This is a vital question affecting the horse-breeding industry and its proper solution is not easy. The time will perhaps be when these men will have to show proficiency in detecting communicable diseases if sanitary sentiment keeps the pace it is now travelling. In the meantime artificial insemination can be utilized to evade these disorders and is being done by the more progressive breeders.

With a better knowledge of the biology of spermatozoa we are learning to surround them with such environment as will properly sustain and prolong their life. The feat of transporting semen distances for the purpose of insemination has been successfully accomplished for a sufficient number of times to demonstrate its practicability as a breeding measure. Breeders have repeatedly carried semen 25 and 30 miles to ranches and have successfully impregnated mares. A breeder at St. Joseph last season made a service and six hours later a mare was bred in Omaha resulting in impregnation. It is not beyond the range of reason or possibility for men trained and equipped to make numerous artificial services at points over a wide territory adjacent to their breeding establishment without ever taking the stallion off the premises.

When we consider that a three- to five-dollar burro can be made to produce a forty to sixty dollar hinny at weaning time by this method one can gain a slight insight into the possibilities of what can be attained by artificial insemination.

The brief references and hints made are not founded on dreams or air castles but are gleaned from personal experience, and those of reputable breeders. The feeling obtains that this subject has been wofully neglected by our profession and that the breeders of today are working out these problems without veterinary aid because the veterinarians as a whole have given the subject very little consideration. Here is a great scientific field almost wholly neglected needing the combined attention of pathologist, bacteriologist and practitioner, whose united investigations would unquestionably reveal a multitude of truths that yet lie deeply buried in mystery.

Dr. Brown: Gentlemen: I have only aimed in this paper to touch some of the more conspicuous points. I feel that while the veterinary profession has made wonderful progress in certain lines, that here is a subject that has been, as stated, almost entirely neglected. It is so closely allied to that of animal husbandry it seems as if it was time the profession gave it more consideration.

Dr. Eichhorn (in the chair temporarily): The paper of Dr. Brown is open for discussion.

Dr. Knowles: Mr. Chairman, the subject that Dr. Brown has given us is one that has given me a great deal of thought, but in a superficial way. I happen to be practising in a breeding country where there has been some attention to artificial insemination at the hands of the laymen. My circumstances have not been such as to take it up practically, either on my own account, or for my clients, but I have realized that there was a field for the veterinarian in working this out in a practical, scientific way that certainly was a large one, and one that we, as veterinarians, have not given sufficient time and study to become even as proficient as some laymen. It is my observation that, in the hands of the laymen, this has been abused and misused to the extent of almost failure. Some of the large breeding and importing establishments that make a practice of selling stallions at high prices to stockmen, have usually, in our country developed some form of impregnator with some kind of directions for placing in the hands of the laymen. I don't know of one that is being used successfully, or of one that has been used even reasonably. Their methods have been so crude that it would be impossible for the spermatozoa to survive the chilling or the infection that will accompany the method used. I would like to ask Dr. Brown if he will just give us a little outline of the technique that he has practised, and what he considers the most essential things to insure a successful insemination.

Dr. Brown: Mr. Chairman, I will say that I mentioned in the paper the three chief requisites for success. They are cleanliness, preservation of proper temperature, and avoidance of exposure of the semen to the bright sunlight. The measures of cleanliness are such as all veterinarians are familiar with, as a preliminary step, in the way of washing the external genitals, the washing of the hands, the use of antiseptics, and, of course, the rinsing in sterile water of the parts.

The technique consists (as I have practised it, and which has been practised most successfully) in the use of an instrument that resembles largely that of a large syringe, having at its long point a flexible tube that can be bent at an angle so as to accommodate itself to the interior. We find in these cases that the semen is, perhaps in a majority of cases, found within the uterus itself, so that it requires an instrument of this character to successfully extract the semen from the uterus. Having this long point, it is bent at an angle, simply carried from the cervix through the os, by a downward pressure that is exerted against the lower wall of the uterus so as to permit a cup-like cavity into which the semen will flow, and the semen is drawn into this instrument. The instrument itself must then be kept in water at as near blood temperature as possible, and I have found that the agent most suitable for passing this semen into the various mares was capsules. These capsules are sterilized with hot water, and a reasonable amount of semen is placed in them, and these capsules are inserted, making the insemination, as stated in the paper, a certainty.

Of course, this subject is very closely related to the subject of sterility, another subject I must confess I don't believe has been given as much study as it should have been, especially in the equine. Dr. Williams, among our American veterinarians is one of those who have given us some most excellent articles in the bovine, but, from my own experience and observation, I confess there is much yet to be learned on that topic in the equine. So, in the shy breeding classes, these cases are to be contended with; and, as stated in the paper, in the early experience of this method, the efforts were confined largely to the shy breeding classes. I confess, gentlemen, that, in the hands of careful men, even though they be laymen, they are making this a successful undertaking in the daily breeding operations; and I know of men that have stated repeatedly that they would quit the business if they were barred from making use of this method. It is seemingly growing in importance, and it is difficult for any of us to conceive to what magnitude it may reach. I cannot question but what there are men sufficiently proficient who can, as I have stated, instead of taking a heavy, ponderous draft horse to the ranch where his services are to be needed, merely extract the semen upon the premises and artificial insemination may be practised at these different points even more effectively than if the stallion himself were present.

Dr. Fox: By this instrument with a flexible end, do you mean a rubber end?

Dr. Brown: A metallic alloy, it is of a metallic nature with a flexible end, in the nature of a flexible probe.

Dr. Eichhorn: That closes the discussion.

Gentlemen, we have a paper on "The Diagnosis of Dourine by Complement-fixation," by Dr. Mohler, Adolph Eichhorn, and John M. Buck. As Dr. Mohler cannot be here, I will read the paper, and as the hour is getting late, I will confine myself to that part of the paper which deals with the diagnosis of dourine by the complement-fixation test.

THE DIAGNOSIS OF DOURINE BY COMPLEMENT-FIXATION

By John R. Mohler, Adolph Eichhorn and John M. Buck
Washington, D. C.

Introduction

Dourine is a specific infectious disease affecting under natural conditions only the horse and the ass, transmitted from animal to animal by the act of copulation, and due to a single-celled animal parasite or protozoan, the Trypanosoma equiperdum. It is characterized by an irregular incubation period, the confinement of the first symptoms to the genital tract, the chronic course which it runs, and by finally producing complete paralysis of the posterior extremities, with a fatal termination, as a rule, in from six months to two years.

History of Dourine in the United States

In the United States the disease was first suspected in 1885 and recognized in 1886 by Dr. W. L. Williams, who was then a veterinary practitioner at Bloomington, Ill. Officials of the State of Illinois took hold of the outbreak, and as a result of rigid prophylactic measures the disease was eradicated from the State in 1888, but not before an affected stallion had been shipped to Gordon, Neb., thereby starting up a new center of infection in that locality.

In 1892 dourine was again brought into public notice by an outbreak among the breeding horses of northwestern Nebraska, the history of which suggested that it originated with this Gordon stallion. After an expenditure of about $5500 by the Bureau of Animal Industry the disease was considered to have been eradicated from that section of the country. Five years later the infection again made its appearance in the same part of Nebraska, and early in 1899 the Bureau again began the work of eradication. Many inspections were made, and those animals which were found diseased were purchased and killed. Many obstacles were encountered, and the disease evidently kept smoldering during 1900.

In 1901 the infection reappeared with increased vigor, this time in the Pine Ridge and Rosebud Indian Reservations in South Dakota, in addition to northern Nebraska, and more stringent measures were immediately inaugurated to control the spread of the disease. However, eradication in this region was extremely difficult, owing to the wildness of the country as well as of the horses and the fact that many horse owners would try to conceal from the inspectors animals which they knew to be affected with the disease. In 1906 the last suspicious cases of dourine were destroyed in South Dakota.

In the meantime, during the year 1903, dourine was reported in Van Buren County, Iowa, and successful steps were immediately taken to stamp it out. No connection could be established between this outbreak and that in Nebraska, but it was quite definitely determined that an imported Percheron stallion purchased by a company of farmers was responsible for its appearance.

Another outbreak of dourine was discovered in Taylor County, Iowa, in 1911. The diseased animals, together with all exposed stallions and mares, were immediately quarantined by the State. Those showing lesions of the disease and those exposed horses that reacted to the complement-fixation test were purchased by the Government and destroyed. It is now believed that the infection is entirely eradicated from Iowa. The source from which this center of infection was derived is only a matter of conjecture, but there is apparently no connection between this and any of the previous outbreaks. No authentic information as to the origin of the outbreak was discovered, but all cases lead back to a Percheron stallion which was imported in 1909 and brought direct to Lenox, Iowa.

Early in July, 1912, the State Veterinarian of Montana reported several suspicious cases of dourine in eastern Montana and forwarded blood sera from the suspected animals for the complement-fixation test. All but one sample gave positive results, thus establishing a new center of infection of dourine. From present indications this outbreak appears to be more extensive than any of the previous outbreaks, involving also two Indian reservations in North Dakota and South Dakota; but a force of twelve Federal veterinarians assisted by state representatives is at work on the disease, and the infection is well under control.

SEARCH FOR A METHOD OF DIAGNOSIS.

The difficulty of diagnosing chronic and latent forms of dourine is generally recognized, and owing to this fact the control and eradication of this disease in horses has been of slow progress and sometimes ineffective. In such outbreaks it has been the custom to trace the disease so far as possible to its origin and then to keep under observation all mares and stallions which directly or indirectly have been exposed to the disease. At the same time animals which show clinical evidences of the affection are destroyed without delay. By this means several of the outbreaks which have occurred in the United States have been checked and eradicated.

The attempt to make a microscopic demonstration of the Trypanosoma equiperdum in affected horses is very frequently unsuccessful, although our more recent experience proves that the organism may occasionally be found in the serous exudate of the plaques and also in the fluid of the edematous swellings of the genital organs in the stallions as well as in the mares.

Of course, this procedure of diagnosis can be attempted only when the disease occurs in farming localities where the animals can be readily observed and examined as desired. On the other hand, in the present outbreak in Montana and adjoining states the conditions make the diagnosis by the demonstration of trypanosomes impossible, and, likewise, animal inoculations cannot be satisfactorily utilized for this purpose. Horses in that locality are bred under range conditions; they run wild and a round-up takes place only once a year. The difficulty of an examination, even clinically, of such animals is obvious, since they have not been broken to the halter and are troublesome to handle.

Our experience with the disease in Montana showed that only a limited number of animals were clinically affected. Nevertheless, the association of all the animals without any restriction in the breeding periods indicated that a larger number of animals would be found infected, which, as a matter of fact, has been proved by subsequent tests, as hereinafter shown.

Owing to the fact that until the last few years the eradication of dourine in this country was supposed to have been complete, the disease has received only slight attention as compared with other menacing diseases of our domesticated animals. It was not until the outbreak in the State of Iowa in 1911 that the necessity for devising a method of diagnosing this infection began to be fully realized. The value of being able to detect the latent and to verify the clinical cases became apparent. Otherwise, the necessity existed of maintaining a long-continued quarantine in those sections of the country where cases have been discovered. While little difficulty has been experienced in recognizing the advanced cases, a clinical examination alone naturally permitted many infected animals to escape detection, only to facilitate the further spread of the disease until the appearance of symptoms made the diagnosis unquestionable.

Inasmuch as the complement-fixation method of diagnosis has been employed with gratifying results in connection with numerous other diseases, the possibility of applying this method to dourine naturally suggested itself, and steps were, therefore, taken to determine the feasibility of its application to this disease.

It was very early discovered that the problem of preparing a satisfactory antigen would offer considerable difficulty. Efforts were primarily directed toward utilizing for this purpose the different organs of those horses that had succumbed to the disease. Several of the clinical cases were shipped from Iowa to the Bethesda Experiment Station during the outbreak referred to, in order that a more complete observation might be made of the development of the disease and that material might at the same time be available for the preparation of an antigen. From time to time, as these animals died, certain tissues were obtained which it was suspected might furnish the desired results; but although shake extracts of the spleens, livers, kidneys and bone-marrow, as well as alcoholic and acetone preparations, were employed under various conditions the results were rather discouraging.

Subsequent to this time there came under our observation publications by numerous investigators who had given this subject consideration. It will suffice to mention the publications of Landsteiner, Müller and Pötzl, Levaditi and Yamanouchi, Hartoch and Yakimoff, Citron, Weber, Manteufel, Manteufel and Woithe, Zwick and Fischer, and Schilling, Claus and Hösslin. The results in these instances appeared to have been unsatisfactory, which was also the case in the extensive work on the diagnosis of dourine by the Wassermann method by Trajan Pavlosévici, as he concluded that while antibodies can be demonstrated by this method in laboratory animals infected with trypanosomes, the method cannot be utilized in stallions affected with dourine.

Later, Winkler and Wyschelessky, Mohler and also Watson in their work on complement-fixation as an aid in the recognition of trypanosomiasis indicated the good results obtained in the diagnosis of dourine. Likewise, Mattes in his work on the agglutination of trypanosomes obtained gratifying results, while Braun also concludes that complement-fixation can be utilized for the diagnosis of trypanosome affections.

In the recorded publications it was observed that the more promising results were obtained by those who employed suspensions of pure trypanosomes. The organ extracts and other preparations of antigens generally used for this purpose proved unreliable. The procedure as recommended by various workers in obtaining an antigen from pure trypanosomes and using such a suspension as the antigen has also been tried by the writers with uniformly good results. The practical application of this procedure, however, would be very laborious and require a great deal of time, especially in cases where a large number of horses have to be tested by this method. Accordingly it was deemed advisable to devise a means by which an antigen could be prepared which would give similarly good results but would not require such delicate and laborious technique. In place of the specific trypanosome of dourine being utilized, the writers selected the surra organism, as it had been previously ascertained by several investigators that the reaction obtained was not absolutely specific for any one trypanosome infection but was rather of a group nature. As dourine is the only known trypanosome affection of horses existing in this country, the value of even a group reaction was immediately appreciated, and attention was directed to the carrying out of this idea in our diagnostic work.

In place of preparing suspensions of the trypanosomes, however, an antigen was made of the blood and macerated spleens of rats killed at the height of surra infection. This material was placed in a bottle containing glass beads and shaken for six hours, filtered through gauze and carbolized. The results from this antigen proved satisfactory, and it was used repeatedly on the blood of the horses affected with dourine that were left of the Iowa shipment.

The smallest quantity of the serum which gave a positive reaction with the antigen was 0.05 c.c.; however, the various comparative tests indicated that fixation in tubes containing 0.2 c.c. of serum is sufficient for diagnostic purposes. Sera from normal animals, also those affected with various other diseases, failed to give a reaction. This antigen proved active on 10 consecutive days, but failed to produce fixation of complement on subsequent tests. Later attempts by the same procedure also resulted less satisfactorily, and it was therefore deemed advisable to try other methods in order to procure an antigen of more uniform action.

The following procedure was next employed:

After successive examinations of the blood of a dog infected with surra, about 200 c.c. of blood were drawn from the jugular vein when the microscopic examination revealed an extreme infestation with the parasite. The blood was drawn into a 1 per cent. potassium-citrate solution in large centrifuge tubes of 100 c.c. capacity. A quantity of potassium-citrate solution was used equal to the amount of blood drawn into each tube, and 0.5 gram of saponin was added to each tube in order to dissolve the red blood corpuscles. After a thorough shaking and after complete hemolysis had taken place, the tube was centrifuged for 30 minutes at 2500 revolutions and the supernatant fluid was siphoned off. The residue, which was of an opaque color and consisted principally of trypanosomes, was then thoroughly mixed and shaken up with salt solution, when it was again placed in the centrifuge; this washing was repeated three times. After the last washing the thrown-down opaque mass was emulsified with 50 c.c. of salt solution and titered as to its merits as an antigen for dourine tests. The results were highly satisfactory, and the titer was established at 0.5 c.c. of this emulsion per tube. However, the disadvantages of this method—namely, the difficulty in the preparation of this antigen and also the small quantity which was obtainable from a single bleeding of a dog—were soon apparent.

In July, 1912, the outbreak of dourine in Montana was discovered, as already mentioned. Several samples of blood sera from clinical cases were forwarded by the State authorities to the Bureau of Animal Industry for verification. Positive reactions were obtained in numerous instances with antigens thus prepared, establishing conclusively the presence of the disease in that state, as well as suggesting the possibilities of the test as a means of its eradication. It was not long before discovery was made that the disease was quite widely spread in Montana owing to the previous failure to recognize it. In an endeavor to comply with the request of the state authorities to make diagnoses in a large number of animals, it was soon apparent that a different method would necessarily have to be devised in order to make the desired progress.

Preparation of Antigen.

Various organs from rats just dead from surra were tried out in both fresh and preserved states, and the results which were obtained from the fresh suspension of the macerated spleen of a rat just dead from surra were the most promising. In order to establish whether such an antigen would constantly, or at least in most instances, give the results desired, it was repeatedly tested on positive sera of horses affected with dourine, as well as on horse serum known to be free from immune bodies of dourine. After repeated tests on horses clinically affected with dourine had shown the antigen to be uniformly constant in its action, the procedure of diagnosing dourine by this method was definitely adopted. It was at this time that our present method of preparing antigen was first employed, which is as follows:

Gray or white rats are infected with surra by the injection of 0.2 c.c. of blood from a rabbit infected with that disease. Since tests have to be made every day to keep up with the large number of cases submitted and as the antigen proves effective only when prepared fresh, it was arranged that at least two rats should die daily with the disease. When the rats appeared to be at the point of death late in the afternoon it was found that placing such rats in the ice chest until they died furnished a better antigen than when they have died in the cage during the night and have to be used the following morning.

The spleens of the rats are removed, placed in a mortar, and ground up with a small amount of salt solution to a pulpy mass. From time to time more of the salt solution is added, and the suspension thus obtained is filtered twice through a double layer of gauze into a test-tube. The quantity of the suspension from each spleen is made up to 40 c.c. by dilution with salt solution.

This suspension constitutes the antigen for the tests of the suspected dourine sera. Dr. Jacob Traum, who was temporarily assigned to this work, found that when the suspension was titered against sera in graduated quantities from a known positive and a known negative case the best results were obtained, and this method has since been adopted. The quantity of antigen employed is double the amount necessary to produce complete fixation with positive serum. The following table gives the method practiced in titrating the antigen:

TABLE SHOWING METHOD OF TITRATION OF ANTIGEN FOR THE COMPLEMENT-FIXATION TEST IN DOURINE.

Positive serum.

Tube No.	NaCl solution.[1]	Serum.	Antigen.[2]	Complement.[3]		Hemolytic serum.[4]	Blood corpuscles.[5]	
	C.c.	C.c.	C.c.	C.c.		C.c.	C.c.	
1	2	0.15	0.05	1	For 1 hour in incubator.	1	1	For 1 hour in incubator.
2	2	.15	.1	1		1	1	
3	2	.15	.15	1		1	1	
4	2	.15	.2	1		1	1	
5	2	.15	.25	1		1	1	
6	2	.15	.3	1		1	1	
Negative serum.								
1	2	0.15	0.1	1	For 1 hour in incubator.	1	1	For 1 hour in incubator.
2	2	.15	.2	1		1	1	
3	2	.15	.3	1		1	1	
4	2	.15	.4	1		1	1	
5	2	.15	.5	1		1	1	
6	2	.15	.6	1		1	1	

Half the quantity of antigen which in the negative serum does not inhibit hemolysis, provided this quantity is at least double the amount necessary to produce complete fixation with the positive serum, indicates the titer of the antigen. For instance, if tubes Nos. 1, 2, 3 and 4 of negative serum show complete hemolysis and Nos. 5 and 6 slight inhibition, and at the same time tubes Nos. 6, 5, 4, 3, and 2 of positive serum show complete fixation and No. 1 partial fixation, the quantity of antigen for the test proper would be 0.2 c.c. of the antigen.

[1] 0.85 per cent. NaCl solution.

[2] Suspension of macerated spleen from rat.

[3] The determined smallest quantity established by titration.

[4] Sensitized rabbit serum.

[5] 5 per cent. suspension of red-blood corpuscles of sheep.

Occasionally the antigen does not prove satisfactory for the test and has to be discarded. In these cases the fixation in all tubes is apparently due to the excessive amount of proteids from the spleen. Experience has shown that the excessively large spleens contribute such an antigen. This, of course, is indicated by the titration undertaken prior to the regular test. At other times it was found that the antigen proved satisfactory the following day, after it was allowed to stand in the test-tube over night and the supernatant fluid drawn off for the antigen. This is then re-titered and the titer established in accordance with the results of the test.

THE COMPLEMENT-FIXATION TEST.

The test proper for the diagnosis of dourine is carried out in a manner similar to that practised for the diagnosis of glanders.[1]

The hemolytic system consists of sensitized rabbit serum, serum from a guinea-pig, and a 5 per cent. suspension of washed sheep corpuscles.

The serum to be tested is, of course, inactivated for one-half hour at 56° C. and is used in the tests in quantities of 0.15 c.c., since it has been found that fixation in this quantity is obtained only with sera of horses affected with dourine. Tests to determine the smallest quantity of serum of horses having dourine which will give a fixation showed that in several instances even 0.02 c.c. of serum was sufficient to give a complete fixation.

The complement from the guinea-pig is always titered previous to the test, as it is absolutely necessary to use the exact amount of the complement to obtain the best results, since a deficiency or an excess of the complement would interfere greatly with the reaction.

In the numerous cases which have been tested the results were almost invariably definite, and only on a very few occasions was it found necessary to make retests on cases which appeared atypical. The reaction is always very marked, and in our work only a complement fixation with the quantity of serum mentioned is recognized as a positive reaction. It is only proper that in the tests the usual number of checks should be employed in order to insure reliable results.

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[1] A more detailed description of the technique of this method as applied to glanders is given by Mohler and Eichhorn in Bulletin 136, Bureau of Animal Industry, entitled "The Diagnosis of Glanders by Complement-fixation."

Since the testing has been undertaken by the method described, 8657 samples have been examined from Montana and the Cheyenne and Standing Rock Indian Reservations in North Dakota and South Dakota. Of these, 1076 gave positive reactions, which appears to be a very large proportion, but when it is remembered that these animals were kept under range conditions without sanitary or veterinary control and also that before the disease was recognized as dourine it has been diagnosed for a long period as some other affection, it will be apparent that the opportunity for the spread of the disease was ideal.

With the present system of diagnosis, by which even the latent cases can be determined, it is hoped to eradicate the disease quickly. All the horses in the infected localities will be submitted to the complement-fixation test, and by coöperation with the State authorities means will be devised to dispose of the affected animals in such a way as to make the further spread of the disease impossible. The animals which were destroyed as a result of the disease in the above-named localities and which were diagnosed by the complement-fixation test showed in most instances some lesions indicative of the disease. In some of the cases there were no indications of a progressive paralysis, but the lesions existing in the genital organs of either the male or female were sufficient for confirmation of the diagnosis by the complement-fixation test.

It is therefore evident that the diagnosis of trypanosome infections of both man and animal by the complement-fixation test is of very great importance, especially in countries where only one of these protozoan diseases exists. By this means it is possible to determine all infected persons or animals within a short time and adopt such hygienic measures as would be best suited for the control of the infection. Furthermore, the introduction of a disease like dourine into any country could also be guarded against by a compulsory requirement of this test on all horses imported from countries in which dourine is present.

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DISCUSSION

DR. A. D. KNOWLES: Mr. Chairman, as I am vitally interested, or the State of Montana being vitally interested, I would like to discuss this just a few moments, as the hour is late, and I will not take up much of your time.

As you will see from Dr. Eichhorn's address, previous to the perfection of the present method of diagnosis, which is only now a few months old, you can at once appreciate why this disease might and did get such a foothold in Montana. I know Dr. Cheney, of Miles City, who is the deputy in charge of that district for the last three years, has been representing to the state authorities that in his opinion dourine existed in that part of Montana. He based his opinion upon certain chronic symptoms, the main one of which was frequently finding stallions on the range with a swollen and enlarged penis. Our clinical examinations did not clear up to the satisfaction of the investigators, because several investigations were made by Dr. M. E. Knowles, who was the state veterinarian, and at different times he called in Bureau men to help him examine these suspected animals. I don't know how many times they made clinical examinations, but at different times examinations were made with the result that they did not think that dourine existed. However, Dr. Cheney continued to report occasionally, that he thought from the symptoms presented, that they had dourine; but it was not until about July of last year that any other investigation was made together with some of the Bureau veterinarians. A number of blood samples were sent to the laboratories at Washington, and the disease was positively diagnosed, and to the satisfaction not only of the veterinarians in charge, but also to the horse owners, one layman of whom described the conditions to me.

Now I live some 300 or 400 miles from the infected district, and we don't suppose we have any dourine in our vicinity. But to rehearse a little, I will say this: some laymen, owners of three large horse ranches in the district over which I practice, one of whom had consulted with me about his horses in that district at different times, and talked with me (rather more of a conversation than it was a consultation) to the effect that he had been losing horses for a number of years on the range among these three ranches, and particularly in one. At different times he had our state veterinarian and deputies and other veterinarians examine these horses to try to locate what the trouble was, and I think it was two years ago that they made quite a systematic clinical examination of this one particular horse ranch or range, and they decided that it was swamp fever that was causing the loss among those horses and did not for a moment suspect that it was dourine. But at this time that I now refer to in which the investigation proved that they had dourine (about the middle of July of last summer), this same gentleman told me that he joined with the veterinarians in a number of tests, and in catching some that showed exceptional clinical symptoms, which he believed were those of dourine. They also endeavored to catch some checks, and did catch some check animals and drew the blood from them to have it examined at the laboratories. Among them was one mare, I think of about middle age, that was a gentle animal, and they caught this mare just for the purpose of a control. The result of the test as reported from the Washington laboratory was to the effect that this mare was a reactor. They destroyed the mare and autopsied her and she showed the pathological lesions to a definite degree. It then imbued confidence in the laymen as to the method of diagnosing the disease, and they believed, and were willing, with very few exceptions, to have the investigations carried to any extreme to eradicate this disease from their herds, now believing that they had had the disease for a number of years among the herds of the largest horse ranch country in Montana, if not in the United States. The result was that the Bureau and the state veterinarian immediately began to coöperate, and the state veterinarian has taken, and is taking, the precaution to try and locate any indication of this disease that may exist any place in the state, and has sent out notices to all deputies to draw blood from any suspected cases and send them to the bureau for diagnosis.

Now we believe, as Dr. Eichhorn has mentioned, that it will be a comparatively short time until the disease will have been eradicated from Montana. But the point I wish to bring out is the insidiousness of this disease, and the fact that it may exist in any locality without the faintest suspicion of the public or the practitioner. I have drawn blood from a few. I have one now in mind, that I have been expecting to draw blood from, but which I do not think is dourine. However, in a precautionary way, we are going to extract blood from all suspicious cases and send samples immediately from every section of the state where there is the faintest suspicion that the disease might exist.

Dr. Davis: We have never had this disease in our State of Wyoming to my knowledge, although we have had several instances where I deemed it advisable to have sent to Washington for examination a number of samples. And just at the time I left Cheyenne I received a letter that informed me that the disease was extensive in eastern Montana, and western North Dakota and South Dakota, and had been found within probably twenty-five or thirty miles of the State line of Wyoming. Upon my return I expect to make an investigation of a part of the country, but it will be rather a rough country and a hard country to get over, and I would like to ask the Doctor if he would please outline to me the amount of blood and the amount of serum and the amount and per cent. of carbolic acid that should be added to a sample for forwarding to Washington.

Dr. Eichhorn: I think that at your request the Bureau will send you a sample of the vials of a certain size, which are now in use for the collection of serum.

In relation to the collecting of blood serum, it is advisable to draw the blood with the aid of a trocar from the jugular vein into a bottle, allow it to settle for one or two hours until a sufficient amount of clear serum separates from the clot, and then pour off the yellow serum into the vial and after it has been closed and sealed, it is forwarded to the laboratory.

Dr. Knowles: Is it a good idea to add a little carbolic acid?

Dr. Eichhorn: In the winter months it is not necessary at all, and when your serum is clear it is not necessary in the warm season of the year. It has been found that clear serum will give satisfactory results even after several months. Of course, the serum may be carbolized to represent 0.5 per cent. of carbolization. You make up a 5 per cent. solution of carbolic acid, and if you have, for instance, 45 c.c. of serum you add 5 c.c. of the 5 per cent. carbolic acid which will make it a 0.5 per cent. solution.

Dr. Knowles: The quantity of say 10 to 20 c.c. of serum is sufficient?

Dr. Eichhorn: Yes, 20 c.c. is ample.

Dr. Watson: Mr. Chairman, I think it is quite obvious to anyone who has had any experience with dourine, that the paper of Dr.

Eichhorn is a valuable contribution to the serological method in the control of that disease. He has drawn your attention to the latent carrier of dourine, and that is a point I think that too much emphasis cannot be laid upon. We are rather apt, in tracing back to the origin of an outbreak of dourine, to have a tendency to implicate a newly imported stallion; whereas, if we go back a little farther, we might then find that the stock stallion contracted that infection from a latent carrier, for the newly imported stallion is extremely sensitive.

In any section where the disease has been running for some years, there is quite a considerable amount of immunity, not an absolute immunity by any means, but an immunity that can be overcome only by an attack of high virulence. It is the latent carriers which are partially immune, but when they come in breeding contact with some new blood of a newly imported stallion, they are likely to affect him, and spread the disease through the district, for once a newly imported stallion is affected, the further spread is very rapid.

We have had that experience of temporary immunity among low breeds of Indian horses especially. I might cite an instance among Indian horses where the government tried to improve their breed by giving the Indians good stallions. Those stallions at different period have come down with dourine since 1904; whereas it is with the greatest difficulty that we can find a case among the mares, but they are undoubtedly latent carriers.

The whole question of serum diagnosis, I think, is wrapped up with and inseparable from that of immunity, and we should study as much as possible the immunity enjoyed by these latent mares.

The question comes up, What are we to do when we have such a large number, as Dr. Eichhorn has stated, of reactors; it certainly does not seem safe to consider them as anything other than latent carriers, and just how long they remain infected, we have not any idea. That has been our experience in Canada. We have been working on it a long time and cannot say how long a latent carrier will remain infected, but some misleading work has been done as to the virulence of dourine. In our experience I think we are almost safe in saying that 50 per cent. of the cases become latent. They are not known clinically, and it is absolutely impossible to diagnose them except by the serological method. We have had both natural and experimentally infected horses under observation since 1905 and 1906 up to the present date. Many of those mares are alive today; they have had offspring year after year, perfectly healthy offspring, and their reaction is growing less and less. But while there are many of them pronounced reactors, I would not like to say how many were absolutely infected, but we have to consider them so. Stallions very rarely become immune. The disease usually becomes more rapid and fatal with them, and they will die generally within two years at the most.

Now to speak a word on that reaction; it is important to know how soon after exposure in an outbreak of dourine, we may expect the exposed mare or stallion to give a reaction.

With experimental infections I have got beautiful dourine reactions in from eight to twelve days after infection, and as far as we may know, I got cases of natural infection in a not very much longer time. And as a paper was read the other morning, I think it was Dr. Archibald's, it mentioned a negative phase, that is, after the first infection, there may be a period in which the reaction grows less, and, in fact, cannot be recognized. Now that may be true in some diseases, but I have not found it so in dourine. Possibly between the first and second paroxysm there is a period when the reaction may grow a little less, not so marked, but it is never absent, and it quickly becomes more and more marked.

There is a question or two I would like to ask Dr. Eichhorn. I can appreciate very much the laboriousness of the methods that Dr. Eichhorn indicated by the preparation of the antigen from the pure trypanosome extract. The results are very fine, but the time involved—it is very well for a few animals, but it is impossible to carry it out when a great number have to be tested, and the improved technique Dr. Eichhorn has advised would be a wonderful saving.

I would ask Dr. Eichhorn if he has simultaneously tested horses' serum with the antigen prepared from the pure trypanosome extract, and also from the spleen? In these cases was it as clear-cut and reliable in the one as the other?

Dr. Eichhorn: We have not tested the two antigens on the same serum simultaneously, but we have tested the serum of an infected horse at different times with the two antigens. The same amount of serum gave equally good fixation with the antigen from pure trypanosomes as with the splenic antigen from the rat. These tests were undertaken with the blood drawn from the infected horse about one month apart.

Dr. Watson: There was another point, and that is in the use of controls. There is a different reaction by the agglutination test in an animal with clinical symptoms and in a latent or immune carrier. We always use as a control a typical clinical case, or one that is in the advanced stages of the disease, and also one or more of these latent cases. So far as the agglutination test goes, we find that it varies in reaction from 1 in 200 to 1 in 5000, according to the degree of immunity that the latent carrier possesses. As years go on, and the immunity grows less and less, animals that have apparently recovered for two years or more, still give a reaction. How long that will be maintained, I cannot say, but it has been maintained for several years without any symptoms whatever. They have offspring each season and apparently are in perfect health the whole time, so that there is every indication that the carrying period of the latent organism of dourine is a very, very long one.

Dr. Eichhorn: I was very gland to hear Dr. Watson express himself on his experience. As far as recoveries are concerned or rather apparent recoveries, I believe Dr. Watson himself is under the impression that a good many animals suffer from a latent form of the disease and are carriers of the trypanosome. This, of course, differs from the present descriptions of the disease relative to its pathogenesis. From the text-books and special publications it appears that after a certain stage of incubation the disease as a rule runs through various stages terminating in progressive paralysis and death. The conditions in Montana appear to indicate a lesser virulence of the disease with a large proportion of the reacting horses showing no clinical evidence for varying periods. And I was rather pleased to learn from Dr. Watson's statement that in his experience about 50 per cent. of the affected cases became latent. It seems that the climatic conditions and the outdoor life of the horses might have some influence on the lessened severity of the disease as compared with the observations made in other countries.

Dr. Watson: There is one point that may be of particular advantage to the veterinarian who is doing that work in the field, and that is in reference to the point which has been brought up here by Dr. Eichhorn. We have been able in some cases to verify these latent reactors by the nature of the development of the disease. Many of these latent carriers will never develop symptoms of the disease, but in some cases sufficient symptoms occur to verify that they have had dourine. Some, within the natural course of events, must get reinfected in the spring during the breeding season. Examining those animals during the winter, perhaps will not disclose more than one case of it. There were two diagnoses on clinical symptoms in one herd I have in mind. We have tested the remainder and found about 10 per cent. of them reactors to the agglutination test. In one outbreak that I have in mind several were destroyed at once, but most of them that were pregnant (this was about February or March) were left for a few months after parturition. Four or five of these cases developed clinical symptoms, which occurred in from three weeks to a month after parturition.

Dr. Knowles: That is a good point.

Dr. Watson: I thought it was a good one and an important one, because it seems as if there was some change that takes place three or four weeks after parturition.

Dr. Knowles: I would like to ask Dr. Watson if he has known of the progeny to react?

Dr. Watson: No, I cannot say I have. In one or two cases the serum of the progeny did not prove as satisfactory as normal controls, since there was a very slight reaction. This may be in the nature of a passive immunity, more than one from infection. We had from 40 to 50 foals born from dourine mares at our station, and in not a single case have any of those foals developed into a clinical case of dourine. Neither have they any immunity to the infection; in fact, they are easily affected. It is interesting to note that Dr. Eichhorn uses the "surra" trypanosome for the diagnosis of dourine. It is quite true that it is a group reaction. However, the reaction is a little more pronounced and really more specific with the strain of dourine trypanosome from a particular outbreak. I have used a dourine antigen from a European strain and compared it with a strain from our Canadian dourine, and I have found that the action is a little more specific with our Canadian strain.

It is interesting to note on that point, that by inoculating a horse with the strain of dourine derived from a particular outbreak, and then testing that horse's serum, the reaction is so specific, that you can get an agglutination reaction under the microscope just by mixing a drop of blood with the same strain of dourine trypanosomes, which is almost instantaneous. This would be a simple way of testing the animals, but unfortunately it will not do with these latent carriers or old cases. These experiments all lead up to the different degrees of immunity existing in the animals. That is a point I think we will have to do more work on.

Dr. Torrance: I do not want to take up more than a minute of your time, and I wish to congratulate you for having brought before us some important new matter of great importance to the horse-breeding industry both of Canada and the United States. We have in Canada made considerable progress in obtaining control over this disease. And I must say that I was dismayed in hearing of the extensive outbreak of the disease just across our border. I am rather pleased to note that it is, I think, confined entirely to range horses, for the reason that we have regulations which prohibit the importation of unbroken horses into Canada. Those regulations are put in force with the idea of excluding possible carriers of glanders infection, on the supposition that it was impracticable to test range horses with mallein on a large scale. And it will also have the effect of protecting us to a certain extent against the possible introduction of dourine animals from this infected area.

I would like to ask Dr. Eichhorn what method is being adopted to deal with these reactors? In our country we have so far destroyed all reactors and given compensation to the owners; but I think at the present time we have only tested on the experimental animals some eight spurious cases of dourine in the Northwest Territory, and I had hoped that we had practical control of the disease. With this large outbreak to the South we may possibly now in the near future have some further signs of infection, and I would like to hear from him as to what is being done to rid the country of these carriers of the disease?

Dr. Eichhorn: Although the finding of these many infections was startling, the state of Montana realized the importance of the situation and immediately appropriated a certain amount of money for compensating the owners of the animals, and they were destroyed; but the reactors were so numerous that the fund was exhausted quite rapidly, and I am not quite certain that the state has appropriated now additional amounts for the compensation and destruction of the infected animals, but I am informed that it will take place, and that all the reactors will be destroyed and paid for.

Dr. Knowles: I have been informed that they destroyed them and the probabilities are that the funds will be exhausted before they are through with it. That is the plan of the authorities; they expect to destroy them, and the law is sufficient so it gives authority for the destruction of these diseased animals, and funds will be obtained by the incoming legislature to repay the owners.

I would like to say in this connection that the district in Montana in which this disease is known to exist is thoroughly quarantined now by districts, and no horses are allowed to be taken or shipped or sold from that district without certificates from the state veterinarian. I have no doubt also Dr. Mohler has to certify to any horses that go out of that district. Then the quarantine notice that was sent to the deputies throughout the state, contains orders to quarantine every suspected district. At the present time the quarantine in the district of Custer and Dawson counties is in force, and it will be extended to every district in which dourine is known to exist. The quarantine further states that any other section that may be found in which the disease may be uncovered will come under the same order of quarantine.

Dr. Torrance: It is very satisfactory to me to know that the state of Montana is taking steps to prevent the further dissemination of the disease, and I would like to know whether similar steps are being taken in regard to North Dakota and South Dakota in those parts which are infected?

Dr. Eichhorn: I am informed that the same steps have been taken for the prevention of the spread of the disease in the other states, and of course the federal authorities are now impressed with the gravity of the situation and are urging the state authorities to take proper measures for the eradication and prevention of the spread of the disease. With the proper precautions it is hoped that the disease will soon be under control and ultimately eradicated.

Dr. Eichhorn (in the chair): Any further discussion? If not, the discussion is closed.

Upon motion duly made and seconded, the session was adjourned for the term, as the program was closed.

SECTION ON SURGERY

Monday Afternoon, September 1, 1913

Second Vice-President John W. Adams, Presiding
L. A. Merillat, Director.

Dr. Adams: Will the Section please come to order? Today I am going to vary the order of the program by asking for the paper on "Inguinal and Umbilical Herniæ," prepared by W. L. Williams and J. N. Frost, of Ithaca, N. Y. I will have this paper come first because Dr. Williams is anxious to get into another section and hear a paper that will soon be ready. Therefore with your permission I will now call upon Dr. Williams.

UMBILIC AND INGUINAL HERNIÆ

By W. L. Williams and J. N. Frost
Ithaca, N. Y.

Umbilic and inguinal herniæ stand apart from all others in relation to the economy of breeding. Due primarily to the arrest in the development of certain structures, they are necessarily congenital, and there is a constant tendency toward the transmission of the defect to the progeny of the affected animal. In herniæ due to mechanical injury, resulting in a rupture of portions of the abdominal walls, the veterinarian is concerned only with the practicability of cure and the danger to the animal's life or value, while in umbilic and inguinal herniæ the most primary and fundamental consideration is the effect upon the breeding value of the animal involved. The hernia may persist throughout the life of the animal without interfering with its general well-being, the animal may retain its normal efficiency for work or for the production of meat, or it may reproduce the normal number of young. We may overcome surgically the hernia or it may disappear spontaneoulsy, but we cannot remove or modify the tendency for the defect to reappear in the progeny of the animal involved.

The foundations for umbilic and inguinal herniæ are laid in early embryonic life. When the fertilized ovum reaches the blastodermic stage and the disk-formed embryonic area begins to fold ventralward, there arises the vitelline stalk and duct, and later there grows out the allantois. For a time the umbilic ring is very extensive, and in many embryos portions of the abdominal viscera lie outside the muscular walls of the abdomen, the urachus and umbilic vessels. Later the abdominal cavity becomes comparatively larger, the umbilic ring contracts and finally the abdominal viscera return into the cavity and the umbilic ring closely invests the urachus and bloodvessels so that the viscera can no longer pass through it. When birth occurs and the umbilic cord ruptures, the urachus and umbilic arteries retract immediately within the abdominal cavity and draw with them portions of the connective tissue of the cord and any peritoneum which tends to project outward, so that the umbilic ring normally becomes obliterated and the cavity filled with connective tissue.

If this normal development is in any way interrupted and the muscular ring fails to become sufficiently contracted, the abdominal viscera remain protruding somewhat through the ring up to the time of birth. If the ring is abnormally large and the tissues within it weak, soon after birth the intestinal tract may become distended with aliment or the intra-abdominal pressure may be increased by retention of the meconium and straining, and the viscera forced out through the dilated ring.

The size of the umbilic hernia presents every possible variation. It may be barely recognizable by sight or palpation, or the defect may be present itself in a great opening many inches in diameter. In a small hernia the ring appears to be round, but is really oblong, and the posterior part is more or less triangular.

The contents of the hernial sac may be omentum, intestine or, in the female, the ovaries and uterus. Umbilic herniæ rarely become incarcerated or adherent. Adhesion, when it does occur, is generally the result of unsuccessful surgical interference.

Inguinal hernia arises in a manner quite analogous to that of the umbilic defect. According to the present view of embryologists, the Wolffian ducts and glands arise from an invagination of the epiblast, and this process leaves behind the inguinal ring and the gubernaculum testis, or round ligament of the ovary. Through this ring caused by the invagination of the tissues which are to form the testicles or ovaries and their excretory ducts these structures later tend to retreat, and along with them there may appear other portions of the abdominal viscera. As in the umbilic hernia, so in the inguinal, the defect depends upon the failure of the ring in the abdominal muscles to become sufficiently constricted. In many cases there is present at the time of birth a well-marked inguinal hernia, consisting usually of omentum or intestine. In some animals there is a tendency toward a spontaneous return of the viscera into the abdominal cavity. The viscera increase in volume so that they do not so readily pass through the ring, while the ring itself contracts somewhat and the spermatic cord enlarges, thus decreasing the opportunity for the protrusion.

The size of the ring and hernia varies greatly. In many animals, especially in adults, the ring is so nearly normal in its size that it is only rarely that the viscera slip through it, in which case they are very liable to become incarcerated and imperil the life of the animal. At the other extreme, the young animal is occasionally born with an enormous ring. In the foal we have observed it five to eight inches in diameter, through which essentially all the abdominal viscera protruded. When the foal was standing, the hernial sac descended to the tarsus. Between these two extremes every possible gradation appears.

Inguinal hernia is observed in all species of domestic animals, most commonly in foals and pigs, and in both sexes, though only rarely in the female. The contents of inguinal herniæ consist largely of omentum in the young; in the adult it is more generally intestine.

Inguinal herniæ in all animals present a far greater tendency to strangulation than is observed in umbilic herniæ. This is due chiefly to the form of the hernial sac, which in inguinal hernia is comparatively extensive in its vertical diameter, with a narrow neck.

The tendency to strangulation, as in all other herniæ, is dependent upon the relationship between the size of the hernial sac and that of the hernial ring. The larger the ring, the less the tendency to incarceration. It consequently occurs that incarcerated inguinal herniæ occur most frequently in adult animals, where the hernial ring is small and a small loop of intestine is forced through the ring under great intra-abdominal pressure, as in a breeding stallion during copulation.

The diagnosis of simple umbilic and inguinal herniæ is generally very easy and calls for no comment. Strangulated umbilic hernia is very rare. When it occurs, the symptoms will depend upon the character of the incarcerated tissue. If of omentum, there occurs at the umbilicus a tense, elastic mass, generally spherical in form, which is irreducible. The animal exhibits no sign of pain, there is no pain upon palpation, the general well-being of the animal is not disturbed. Upon laying open the tumor, there is revealed a black, necrotic, odorless, aseptic mass.

When a portion of the intestine becomes incarcerated in the umbilic ring, the general symptoms of incarceration or obstruction of the intestinal tract ensue—acute abdominal pain, with a tense, irreducible tumor at the umbilicus.

In some cases umbilic hernia is complicated by umbilic infection, especially in young animals only a few weeks old. There may in such cases be simultaneoulsy a purulent umbilic fistula or an umbilic abscess along with hernia. Sometimes it is exceedingly difficult to differentiate between an abscess and a hernia, and it may be wise in these to make an exploratory puncture, rather than an incision, in order to clear up the diagnosis. In all cases it is of great importance to use the utmost caution when navel infection is present, with considerable swelling, because the swelling may be due in part to each condition, and a hernia may be unwittingly invaded.

While there are many ways by which umbilic hernia may be handled, they may be resolved into a few fundamental plans, the details of which may be exceedingly variable. We may apply the bandage or truss, irritants, clamps, ligatures and sutures.

The handling of umbilical hernia in domestic animals is not always simple or satisfactory. In many cases of small herniæ apparent spontaneous recovery may occur, but it is generally more apparent than real. The viscera become larger and cannot so readily drop through the small opening, and the ring itself probably contracts some in certain cases. An important element in apparent recovery is the increased size of the abdomen, with which the difficulty of observing the hernia increases. Hence a hernia which would be very prominent upon the small abdomen of a newborn animal becomes inconspicuous upon the large abdomen of an adult, although the size of the defect remains the same. However, since umbilical hernia is chiefly objectionable because of its looks rather than from any menace to the health of the animal, an apparent recovery is quite as good as a real one.

In the umbilic hernia of quadrupedal animals we cannot secure the same efficiency by bandaging which is observed in human practice. A bandage may be applied to the umbilicus in the infant, and the patient kept upon its back while the filling and hardening of the umbilic area occurs, but in our quadrupedal animals the body position is altered and we cannot by bandaging keep the abdomonal visceria out of the hernial ring, unless we construct a projection upon the bandage which will press into the ring, which, while keeping the viscera out of it, will also keep the margins of the ring apart. Bandaging is therefore of little consequence, except that in some cases it may possibly please the owner by apparently doing something.

The great obstacle to overcoming umbilic hernia in quadrupedal animals is the weight of the abdominal viscera. The obstacle increases as the superficial area of the hernial ring and the weight of the abdominal viscera increase. Thus, for example, an umbilic hernia with a ring one inch in diameter presents a superficial area of 0.7854 square inches, while a circular hernial ring four inches in diameter offers an area of 12.56 square inches, or sixteen times as great an area as the hernia of one inch. It is probably sixteen times as difficult to control surgically an umbilic hernia four inches in diameter as it is one which is but one inch in diameter. The difficulty of handling increases rapidly also with the age of the animal, especially in ruminants and solipeds, because of the rapidly increasing weight of the abdominal viscera, not only a positive increase in weight, but a relative increase in proportion to the growth of the animal. That is to say, in a newborn calf, virtually without a rumen, the comparative weight of the viscera, as related to the size of the animal, is not nearly as great as it becomes when the rumen is developed.

Irritants may be of very great variety. We may inject subcutaneously such irritants as oil of mustard or turpentine, or we may apply these externally to the skin. We may be more radical and apply such escharotics as concentrated nitric acid. The aim of each of these is to set up such a degree of irritation at the umbilicus that profuse extravasation shall occur in and about the hernial ring, to later become sclerotic and occlude the opening. This plan has its advocates, and is certainly efficient in many of the smaller herniæ. It is, however, rather difficult of application in some instances in the male, because the irritants are liable to involve the sheath of the penis, especially in the bull, where the opening of the sheath is immediately against the hernia.

The rule which we have laid down, that the difficulty in overcoming the hernia is in proportion to the area of the ring, should especially be borne in mind when considering handling by means of escharotics. The escharotic, or irritant method of handling hernia is accordingly not efficient where a large hernial ring exists, and other methods need be adopted.

Operative interference upon umbilic and inguinal herniæ should uniformly be carried out under complete general or local anesthesia. Aside from the sentimental aspect of avoiding pain, anesthesia is highly essential from the standpoint of safe surgical procedure. Neglect to produce anesthesia is responsible for a large proportion of the serious accidents in hernial operations, such as puncturing or incarcerating intestinal loops, leading later to adhesions, intestinal fistulæ, intestinal necrosis or fatal peritonitis.

In the larger animals the control of the patient can only be had by general anesthesia, because disturbing struggles occur quite as much from the confinement as from the surgical pain. In smaller animals the surgeon may largely control the struggles against restraint and may avoid surgical pain with local anesthetics.

In all operations for either umbilic or inguinal hernia the patient should be secured in dorsal recumbency with the head declined.

When clamps are applied for the cure of umbilic hernia the principle should always be to draw the hernial sac out as far as possible and fix the clamps as close as possible against the hernial ring. By drawing the skin and skin muscle very tight and including a considerable volume of skin drawn from beyond the hernial ring, its margins may be brought into contact, thereby obliterating the previously existing cavity. The clamps are to be applied so tightly that they will cause prompt necrosis of all tissues included within them. The irritation caused by this incarceration and necrosis is expected to lead to an extensive infiltration like that occurring from the application of chemical irritants, which will fill up whatever space remains in the umbilic ring, become sclerotic and permanently occlude the opening.

One of the chief defects in the use of clamps is that while the hernial sac is sloughing away the viscera tend to push down through the ring and form a new sac. This may be prevented in a measure by applying a bandage over the clamp or having tapes extend from the clamp around the body of the animal, so that the clamps may be kept constantly pressed against the ring and the downward pressure of the viscera thus overcome.

Another serious objection to the clamp in male ruminants is that the sheath is in such close proximity to the umbilicus that it is inconvenient if not impossible to apply this method properly.

The ligation of the hernial sac is essentially the same in ultimate plan as the handling with clamps. The only real difference is that, with the ligation, the pressure upon the hernial sac is equal in every direction, while, when the clamps are applied longitudinally, the pressure is from side to side. Both the ligature and the clamps are commonly retained in position either with the aid of sutures or with skewers passed through the sac on the distal side of the ligature or clamps.

The most surgical and certain method for overcoming hernia is that of sutures. These may be applied in a great variety of ways. The hernial sac may be picked up, the neighboring skin drawn over the hernial ring, and sutures passed through the sac just outside the abdominal muscles, and these may be rendered continuous in a manner to cause a complete necrosis and dropping away of the hernial sac, the same as with clamps or ligatures. We may, however, apply the sutures in such a way that they will not produce extensive necrosis and will leave the hernial sac intact. By this plan, after shaving and disinfecting the skin over a large area, the operator grasps the hernial sac and draws it out as far as possible, while the two opposing layers of skin are brought into close contact by firm pressure from side to side between the thumb and finger tips immediately over the hernial ring. If the ring does not exceed one inch, and the animal is young, this tension upon the skin brings the margins of the ring in contact. A needle armed with sufficiently strong suture material is then inserted beneath the skin two to four inches to the right of the ring, and about one inch in front of it, and is passed through to the opposite side and brought out two to four inches to the left of the ring. The needle is then reversed, and is again inserted under the skin about one-half inch posterior to the point of emergence and is carried across in the opposite direction and brought out at a point about one-half inch posterior to the point of beginning. During the passage of the sutures through this part, the thumb and fingers of the left hand must keep the hernial sac firmly pressed together so that no intestine can possibly enter, and the needle must pass close by the tips of the thumb and fingers, thus avoiding any danger of intestinal wound. The suture is then tied firmly, so that the tissues included within it are brought into close contact. Another suture is then to be inserted in a similar manner about one-half inch posterior to the previous one, and a sufficient number of these applied, until the posterior part of the ring has been passed for a distance of about one inch. A large antiseptic pack is then placed over the hernial sac and a many-tailed bandage applied over the entire abdomen. The bandage and antiseptic pack are to be renewed once or twice daily for one week. The results by this plan are generally excellent, but are not as certain in large herniæ as in the smaller ones.

When the hernial ring exceeds about two inches in diameter, this form of handling will not as a rule suffice, and it is usually preferable to open the hernial sac and suture through the hernial ring itself. We may select one of two fundamental methods of operating and carry it out with greatly varying details. We may cut through the skin and subcutem down to the peritoneum of the hernial sac, carefully dissect this away and push the peritoneal portion of the sac into the abdominal cavity, after which sutures may be laid across the hernial ring from side to side and the margins drawn together without invading the peritoneal cavity, thus decreasing the danger from peritonitis.

The second plan is what we may term the open method, in which the hernial sac is completely penetrated and the peritoneal cavity freely opened. Sutures of sufficient size and power are then inserted through the lips of the hernial ring and the margins brought together. After the operation has been completed and the wound closed by two or more sets of sutures, the antiseptic pack and bandage should be applied as in the preceding paragraph.

No form of handling is thoroughly reliable as to results. The probability of cure, as we have already stated, depends in part upon the area of the hernial ring, and partly upon the weight of the abdominal viscera. In adult animals a further serious obstacle to handling is the firm, unyielding character of the hernial ring, rendering it highly difficult to bring the margins of the ring together, and we hesitate to remove a triangular piece of the ring at either end to permit the margins to come together because we thereby increase greatly our difficulties because of area. In our clinic we succeeded in securing recovery in a yearling colt with an umbilic hernia having a ring of approximately four by eight inches. In older animals with a greater mass of abdominal viscera, we have failed in instances of much smaller herniæ. It is accordingly highly important that umbilic herniæ should be treated early in the life of the animal, when the hernial ring is more pliable and the superposed viscera of less weight.

The handling of the inguinal hernia is conducted upon similar principles to that of the umbilic, but must be varied in detail because of anatomical relations. The position of the scrotum and the delicacy of the skin of the region render the irritant or escharotic method of handling undesirable. Clamps have no possible advantage over ligatures. They have the disadvantage of difficulty in application and cannot be applied so close to the internal ring.

The handling of strangulated inguinal hernia is one of the most urgent surgical procedures with which the veterinarian meets. It is seen chiefly in adult stallions, but may occur at any age and in any species of domestic animal.

The diagnosis of strangulated inguinal hernia usually calls for care and skill. In rare cases the incarcerated portion of intestine is voluminous and descends into the scrotum. Generally only a very small loop of intestine is incarcerated and does not protrude beyond the external abdominal ring and may be neither visible nor palpable externally. In such case the veterinarian is compelled to make his diagnosis in the larger animals by rectal exploration, identifying by palpation the intestinal loop incarcerated in the internal ring.

In some cases the hernia may be reduced by external manipulation, especially if the animal is placed in the dorsal position and under complete anesthesia. The reduction may be favored in the larger animals, like the stallion and bull, by rectal manipulation, the incarcerated intestine being grasped and drawn upon cautiously.

It should always be remembered also that the incarcerated intestine becomes filled more or less with blood poured out from the intestinal walls and with gases generated from the aliment within the incarcerated loop. These form a great impediment to the return of the intestine, which may be overcome by puncturing with a small trocar or hypodermic needle.

If reduction fails, herniotomy should be performed. The operation is to be performed under the most rigid asepsis and complete general anesthesia. The scrotum is opened and the superior portion of the inguinal canal laid bare down to the incarcerated intestine itself. The point of incarceration is at the internal ring, which needs be dilated by incising it at the antero-external angle with a probe-pointed bistoury. The incision should not be extensive, because it does not require much dilation to allow the intestine which has passed through the ring to return again.

After the return of the intestine into the abdominal cavity, the incision through the internal ring should be closed by means of sutures firmly enough to prevent the recurrence of the accident. The external wound is then to be closed.

If the operation has been sufficiently clean, there is no necessity for castrating the patient. If it is desired to castrate, it is best done by the "covered" method.

In non-strangulated inguinal herniæ there is a well-marked tendency toward spontaneous recovery in the foal, providing the hernial ring is not more than one to one and one-half inch in diameter and the hernial sac is not very large. It is only extremely rare that the scrotal hernia of foals becomes incarcerated. A very large proportion of foals at birth have a small loop of intestine in the inguinal canal or in the scrotum, but these largely pass unnoticed, and, with the development of the animal, the condition ordinarily ceases to exist when the foal is six to twelve months old. With other domestic animals, the tendency to recovery has not been so well studied because, with meat-producing animals especially, it is desired to castrate early, and consequently the hernia is handled at that time, so that the ultimate fate of the defect is usually unknown, except under surgical interference. It is important that the question of interference or non-interference be determined early. In large herniæ in foals we deem it best, unless there are urgent reasons for haste, to wait until the foal is eight to twelve weeks old and the tissues have acquired a considerable resistance. Sometimes, however, in very large herniæ, where the hernial ring may be six or eight inches in diameter and the hernial sac extends down to the hocks, the case becomes urgent and handling must be undertaken.

Since inguinal hernia is undeniable proof of an arrest in the development of the part and quite definite evidence of an hereditary taint which is liable to recur in the progeny, it is important that the veterinarian should always urge the castration of the patient in case the hernia is well marked.

Two methods are proposed for operating upon these cases. The most common and convenient is the castration by the covered method. The skin and dartos are cut through freely and the cremasteric fascia laid bare. The intestines or omentum are pushed into the abdominal cavity, and the testicle, covered by the peritoneum and cremaster, is grasped, and the mass rendered tense by traction, while the areolar tissue separating the cremaster from the dartos is divided with the fingers up to the internal inguinal ring. A ligature of stout silk or linen should then be carried through the cremaster and spermatic cord by means of a heavy needle, up as close to the internal ring as it is possible to reach. The needle is then to be laid aside and the suture tied very tightly and securely around the cremaster and the enclosed tissues. Great care must be exercised in drawing the sutures tightly so that the incarcerated tissues shall promptly necrose and drop away, since otherwise there is great danger of suture infection and schirrhous cord. The testicle, surrounded by the cremaster, is then cut off with scalpel or scissors, at least one inch below the ligature. Great care must be taken not to cut the cord too close, lest the ligature slip off. When the stump is released under these conditions, it tends to draw up into the abdominal cavity and, drawing with it the cremaster and peritoneum, produces a cone which prevents the passage of intestines or omentum through the ring. If the ring is very large and the broad expanse renders the operation insecure, a large pack may be placed in the external inguinal ring and retained in place for twenty-four hours by suturing the skin over it.

When the inguinal ring is extremely large, this plan of operation will not suffice, and it is necessary to lay the large ring completely bare and suture the margins of the ring to each other, thus firmly closing it. In such a case it is essential first of all to castrate the animal as described above. The external abdominal ring is then to be closed by sutures, the ligated tissues of the cremaster, etc., protruding through the external ring. The external or femoral margin of the ring may be virtually absent and the operator must find secure insertion for his sutures in the crural aponeurosis, taking care not to wound the femoral artery or vein. When this has been completed, an antiseptic tampon should be placed against the ring and retained in position for twenty-four hours.

In conclusion, it is well always that the veterinarian should bear in mind that these two forms of herniæ are congenital, and largely hereditary. Consequently the veterinarian should aim, whenever possible, to see that the animal is excluded from breeding. An exception to this rule may well be made in those cases of adult stallions where a small loop of intestine is forced through an apparently normal inguinal ring causing an acute strangulated hernia, which, unless promptly relieved, will rapidly prove mortal. So far as we know, such cases are not hereditary defects, but are rather due to the mechanical displacement of an intestinal loop through a normal ring, and have no serious meaning for the breeding value of the animal in case it recovers.

DISCUSSION

Dr. Adams: Now, gentlemen, although the time has been slipping on, and it is 3 o'clock, we should have a good discussion on these papers. A good many of you have had experiences probably that do not coincide with those of Dr. Williams, and we want to hear from you. I wish you would ask Dr. Williams questions about various things that occur to you, or have occurred to you or been suggested by experiences you have had in your own practice. He would only be too glad to answer these questions and we will be glad to hear the answers, and these things will suggest other things. I would like to hear a good, lively discussion on that paper. There is a good deal that can be said.

For instance, I would like to know in the first place, in a yearling colt, when I should apply the clamp method and when I should adopt the radical method. In other words, how will I estimate by fingers whether the ring is so large that I ought to do an open operation, or what we call a radical operation, or whether I should attempt to cure it with the clamp. Take a yearling colt, we'll say, of draft breed, and suppose, Dr. Williams, as I press the hernial contents back into the abdomen I find that the ring apparently admits two fingers lengthwise and one finger crossways, is that a suitable case for the radical operation, or would you suggest that I try, for instance, the clamp? This ring that I am describing will admit two fingers running parallel with the linea alba—that is, lengthwise with the colt—and apparently the width of one finger, an area.

we'll say, of two inches by one, two square inches. I am just asking this question because I want to get the discussion started; that is all.

Dr. Williams: Do you wish me to answer these as they come up, or wait until all the questions have been asked?

Dr. Adams: Suppose you answer them as they come up.

Dr. Williams: I should say in such a case as that, as a general rule, you would succeed by some of those strangulation methods, using a ligature with the clamps, in probably 60 to 75 per cent. of the cases; but in a yearling colt it wouldn't be nearly so certain of good results as the radical operation.

Dr. Merillat: I would like to ask Dr. Williams what success he has had with hernia operations in which he does not sacrifice the testicles?

It seems to me that the veterinary surgeon of today is confronted with no greater problem than that of curing scrotal hernia without sacrificing valuable breeding animals. I confess we have not been able to standardize a system of curing formidable scrotal and inguinal herniæ of a stallion without taking away the testicles. All our attempts to save the testicles have been futile; we have either failed to cure the hernia, or we have had fatal results. I think we should be able, however, to do better work in this direction. It is certainly needed. If Dr. Williams can bring out a plan of operation that would standardize itself in our profession, I think he will have done a great deal especially for the western breeding farmers.

Dr. Williams: Mr. President, I do not know that I understand Dr. Merillat fully, whether he means the large hernia or the small strangulated hernia. Which was it that you had in mind?

Dr. Merillat: Well, I mean herniæ as we meet them; they are all sizes. I think this discussion should go into a consideration of all of the various hernias. What should we do, and what should we recommend, in the case of a splendid breeding animal affected with this terrible condition, who otherwise would be destined to lead a useful life as a breeding animal but which now has a scrotal hernia? What should be our recommendation, if it is small, if it is medium, if it is large?

Dr. Williams: I have never had occasion to attempt to save the breeding value of a stallion in inguinal hernia. In our paper we have taken the position that it is undesirable to keep such stallion as a breeder, unless the non-strangulated hernia is very small. Upon the question of the strangulated inguinal hernia, I have not in recent years, since making a good, earnest attempt at aseptic surgery, had opportunities to test the practicability of operating and retaining the affected gland, as I am not in a horse breeding region. We do other operations, however, which are similar to it in the care required and get along very well with them. So far as I can see, Dr. Merillat's question is one of the ability of the surgeon to carry out thorough asepsis. The one great difficulty in such an operation is insufficient aid and equipment for the operation. We must have a first class anesthetist to produce complete anesthesia, and trained assistants who will not be forever getting in our way, and most of all we must train ourselves to do clean work. When that is done, the problem of small incarcerated herniæ is solved. I can see no reason why a veterinarian with sufficient equipment and assistance cannot perform an aseptic hernia operation as well as we perform an aseptic operation for instance, in the large schirrhous cord that leads us six or eight inches up into the abdominal cavity and leaves a hole in the peritoneum of eight or ten inches in diameter. We can do one, it seems to me, just as well as the other. It is a question of accuracy and technique whether we succeed.

I do not know that I have answered Dr. Merillat fully. In the case of a large hernia I would say, castrate by all means, not only on the side where the hernia is, but also on the other side. With a small hernia I should certainly try to save the testicle, although that is simply a matter of sentiment, because the stallion is really just as good with the one testicle as he is with two.

Dr. Merillat: Mr. Chairman, a stallion would not be as desirable at a fair, nor he would not be as useful to sell, if he had but one testicle. There is, of course, some objection against breeding to a horse with only one testicle. It seems to me that our problem here is to work out the proper detail of technique at the seat of the hernial orifice that will effect a thorough and sure closing of the orifice.

I have always found, when dissecting a hernial sac, out to the very level of the ring, that the peritoneum and the cremaster are so thin that there is nothing to work upon; it does not afford a good, strong support for the hernia. I get scared when I get down to that thin place around the ring, where the tunics are so delicate; and if we make use of these tunics to effect a closure, then we are compressing the cord and getting complications, not from the immediate lack of aseptic methods at the time, but by weakening the circulation of the whole testicle. Subsequent trouble is sure to creep in; infection follows not today, nor tomorrow, but some days later, because we cannot so hermetically seal up such places in animals as we would like to, and by weakening the tissues, through squeezing them up in our sutures around the orifice, complications are pretty sure to follow. To open everything up, and to try to close up the hernial ring, we do the same thing again, because in pulling the ring together we squeeze the cord, and again complications follow.

It seems to me that what we should try to get at is some suitable technique that would close the ring sufficiently to allow a free circulation to the testicle and still close the orifice. Can we do so, or is this a hopeless undertaking? I know that what Dr. Williams has said is very true. He has come out of this situation very nicely by saying that all stallions affected with hernia should be castrated, not only on the affected side but the other side as well. But owners of horses think otherwise; they can hardly be made to believe that because an animal has developed scrotal hernia it should be killed. They often keep them for years and breed them, no matter how many hernias their progeny may have. I really believe, as I said before, that we have a big problem here to work out. Those of you who have had experience in this connection should speak out and let us see whether we really have an operation that is useful.

Dr. Stringer, of Illinois, once cured a hernia by pushing the testicle into the orifice. He took the testicle, pushed it into the inguinal ring, and it stayed there, acting as a cork in a bottle and the animal led a useful life afterward. I believe the doctor said that the horse was shown at fairs after that, and the judges never noticed the absence of this testicle.

Dr. Hoopes: I would like to ask Dr. Williams a question: would you favor operating on colts that have inguinal hernia, when at the time they are a year or a year and a half old they show no evidences of it, so that if they had to be castrated you could castrate safely at a year and a half? Some of them have quite large hernias as colts, but when the intestine becomes enlarged by heavy food they disappear entirely.

Dr. Merillat: I would like to answer that question but think Dr. Williams has already answered it. Herniæ are not formidable when you can castrate the animal. When the testicle can be removed, they can easily enough be cured and very few will recur. They can be cured at any age; it doesn't make so much difference how large a hernia is or how large the orifice is. If willing to sacrifice the testicle, and advantage is taken of the large cord and the large structures available to plug the orifice without exposing the abdominal cavity, one can operate on scrotal hernias with good results. It is not so, however, when attempt is made to leave the testicle in the scrotum.

Dr. Williams: Mr. President, in answer to the doctor's question, whose name I do not recall, foals born with comparatively small herniæ will recover, and the operator should give them time to do so. However, he should use care when he is to operate, and even with the very greatest care, once in a while he is likely to get into trouble. I think perhaps my colleague Dr. Frost can cite a case in point; I remember one very well, of a two year old mule which was presented to us without any history of hernia. We operated upon him and he stood for an hour or two before leaving the college, and when he was two miles out on the road the intestines protruded with a fatal result.

In reference to the other matter, I don't know just how large a hernia Dr. Merillat has seen of the inguinal type. We have seen some which really unnerved us in earlier days in regard to size, where practically all the abdominal viscera, for instance, fell out through the inguinal ring in the newborn foal. In mature stallions we have seen hernia in which we could insert one hand into the rectum and push the hand, covered by the rectum, out through the inguinal ring and grasp a man's hand through the scrotal walls on the outside. That type of hernia struck us as not being very easy to operate upon, and while we have not tried it during the past few years, some of our earlier efforts resulted in disaster. More recently we have had similar operations, one of which was a case involving scirrhous cord, where we had an opening of about four by eight inches, I think, through the peritoneum, so that the intestines were lying entirely bare, and in that case we succeeded very nicely in suturing the median margin of the ring to the crural fascia, and holding back the intestinal mass. I agree with Dr. Merillat that in a case of small hernia in the breeding stallion where it becomes strangulated we have a very considerable problem, one, however, which seems to me is perfectly capable of solution, the principal element being careful, aseptic surgery. I do not believe that one need go so far, as Dr. Merillat intimates, as to strangulate the testicular circulation. The cut which we make through the internal inguinal ring will of itself tend to bring about an adhesion to the cord. That is, those parts have been more or less damaged, and if we suture moderately tight there, so as to prevent the intestines slipping out between the ring and the cord, I think that, as a rule, we would get very good results.

Dr. Adams: The cases that give us the most trouble occur in middle-aged or old stallions, usually at night and we then have great difficulty in doing the sort of operation we would like.

Dr. Williams said one thing that I do not understand. I understood him to say that after doing a herniotomy and cutting the constriction of the processus vaginalis, he sutures the latter at the point of incision. If we make a puncture, just large enough to pass the instrument through, how can we go up the canal four or five inches and place sutures?

Dr. Williams There is a difference in the method of operating. I was thinking of a thoroughly free incision instead of a restrictive incision.

Dr. Adams: I always tell the owner after doing herniotomy, that in my opinion it is better to remove the testicle by the covered operation, that the swelling produced by the herniotomy will close the opening for a few days, but that after two or three weeks the horse will be in greater danger than he was before he had the hernia.

In a number of my cases where the testicle was left there was a return of the hernia and death before assistance could be rendered.

A Voice: Dr. Williams, you didn't mention the case of hernia which had been operated upon, in which there was an adhesion, the whole mass being turned into the abdominal cavity and sutured up from the outside. Do you agree that good results can be accomplished in that way?

Dr. Williams: Mr. President, I would agree with it so far as it goes. We have tried that line in one case of developed hernia, and we had an adhesion in that case, and it seems to me that we failed. Dr. Frost, do you remember that case?

Dr. Frost: Of the strangulation?

Dr. Williams: I wish you would just speak of that Dr. Frost. I have really forgotten about it.

Dr. Frost: That was a case that had been operated on before; I think it was a yearling colt. It had an adhesion of the intestine to the sac, and also on the day of the operation had strangulation of that sac. We dissected down to the peritoneum and turned back the mass into the abdominal cavity and then sutured the ring, but the case never recovered.

Dr. Williams: We operated two or three times on that. We had, however, a large ring, which was very firm and which we failed to bring closely enough together to get a good adhesion.

A Voice: I would like to ask Dr. Williams whether in a young animal, where the sac had become escharotic so as to cause an intense irritation, and it would not afterwards reduce, leaving a permanent, chronic swelling, would you advise a radical operation then?

Dr. Williams: A permanent swelling, you say?

A Voice: A permanent swelling, yes; inflammation of the testicles, inflammation of the connective and subcutaneous tissue.

Dr. Williams: Scrotal hernia?

A Voice: Yes.

Dr. Williams: I do not see what else could be done except to castrate the colt. I should think it would be highly desirable there.

Dr. Adams: I would like to remark upon the closure of large umbilical herniæ. For a number of years I was uniformly unsuccessful in closing by the radical method umbilical herniæ rings that would admit four fingers in length and two fingers crossways, but during the last two or three years I have had uniform success, and I will tell you what I do.

In congenital umbilical hernia the edges of the hernial ring are usually very thin, and sutures through them do not hold well. The inelasticity of the abdominal tunic is the obstacle when you try to tighten the sutures. When you have a colt on his back and the abdominal wall is slack, you can with coarse sutures pull the edges of the ring together, but after a few days the sutures cut under the tension, and eventually you have a ring as large as before and sometimes a little larger by reason of the suture-cuts. If we can only lessen the tension of the abdominal tunic the problem will be largely solved. That is what I do, and in the following manner:

I expose the peritoneal sac by a long antero-posterior skin incision and continue laterally till I have not only exposed the entire sac but also the abdominal tunic for a distance of three inches on all sides of the hernial ring. Owing to the intimate union of the peritoneum with the rather thin edge of the hernial ring, I do not attempt to dissect the peritoneum from the edge of the ring, but make an incision entirely around the ring at a distance of about a half inch, carrying the incision through the abdominal tunic and underlying muscle down to but not through the grayish-blue peritoneum. I then push the sac with the attached edge of the ring into the abdomen, and with the fingers separate the peritoneum and abdominal muscle for a distance of about an inch all round the hernial ring. Coarse interrupted silk or linen sutures at intervals of one-half inch are then passed through the tunic and muscle, taking a deep hold. In this manner I introduce as many sutures as may be needed, but tighten none of them at this stage of the operation. The inelasticity of the abdominal tunic is overcome by making two or three concentric rows of one and one-half inch incisions through the abdominal tunic. The sutures are then tightened and tied, the edges of the ring approximating readily. The loose skin is then drawn through a straight metal clamp and wire nails pushed through the skin close beneath the clamp to insure further security. An antiseptic dusting powder, pad of sterile cotton and a wide muslin or ticking binder complete the dressing. The clamp sloughs off after twelve to fourteen days, the edges of the skin separate two or three inches, to unite after two or three weeks by cicatrization. The sutures in my hands do not become encysted, but maintain a suppurative inflammation, with a broad tabular swelling discharging pus through one or more openings. About two months after the operation the sutures may be safely removed. Some can be drawn from the fistula, others cut down upon and removed, and soon after all are out the swelling almost completely disappears. This treatment has given me the greatest satisfaction.

Dr. Merillat: Mr. Chairman, pardon me for monopolizing your time. I would like, however, to bring out two points in connection with this hernia. One of them is the liability of making a mistake in the position of the sac in the recumbent position. When the subject is on its back, the same skin that covered the sac in the standing position is not over the sac in the recumbent position. In doing clamping operations it is possible to pick up some skin and put on a clamp, or a ligature, and suture, and when the patient is up you might find that the whole affair is about an inch in back of the orifice. That is the difficulty that I universally meet in operating on umbilical hernia. This is overcome by marking the zone of skin that covers the sac in the standing position just before the patient is thrown down. I don't know whether others have met this same difficulty or not, but I meet it universally. Understand me: before a patient having umbilical hernia is put in the recumbent position, in preparation for an operation of any kind, the zone of skin that covers it in a standing position should be marked out, and when the patient is down you will be surprised to find that these marked points are way out one side or to the other, and you must always operate on this zone of skin; it makes no difference where it is found in the recumbent position. Then when the patient is up it will be found that the clamp or ligature is right over the orifice. I think this point is worth while bringing out.

Another was mentioned by Dr. Williams. I think the most splendid operation that Dr. Williams mentioned here was the one in which he used the sac for a plug. That is the operation that gives the best success. In umbilical hernia, you have the skin and the underlying layer of connective tissue, plus a peritoneal lining which need never be cut into. The skin can be incised, the sac dissected away and then pushed in bodily into the hole, and then Dr. Adams' clamps put over it. Usually the adhesions which take place in this curled up peritoneal plug are sufficient to cork up the opening. It fails, however, in the large ones, as Dr. Williams has said.

My method of handling these is entirely a covered method by which I utilize the peritoneal sac for a plug, and that is the skewer method. Where the veterinarians have often failed by using skewers is, that they transfix the whole sac, peritoneum and all, with the skewers, and then when they pinch it up the peritoneum, skin and all, sloughs away, leaving another sac to pack down. Now, if the skewers are carefully put in between the skin and the underlying sac (one transfixing it along the longitudinal line and another to cross it at a right angle) and then a strong ligature put behind the protruding ends of the skewers, the peritoneal sac is pushed into the hole as a plug; the inflammation that supervenes in such an incarceration of tissue is sufficient to cause adhesions in this peritoneal plug. I want to assure you that many large umbilical hernias can be cured without ever having to open up the abdominal cavity at all or endangering the life of the animal. A number of our students have reported trouble following this operation, which, of course, as you know, might result where the proper cleanliness had not been respected in the application of the skewers. A dirty skin or a dirty skewer might easily produce serious trouble. The age of the animal does not materially depreciate from the success of this operation. It is the size, of course, of the orifice that would tend to make the operation unsuccessful. But I believe by this covered method, hernias with a large opening can often be cured which would not yield to any of the other methods.

I rather think that the case described by Dr. Adams can not be included in this category, because here he had peritoneum, skin and connective tissue all fused into one structure that would have prevented separation of the two with the skewers.

Dr. Adams: Well, gentlemen, this has been very pleasant and very profitable, but we must get along now to the next paper. I will first call on Dr. Trickett to read his paper on "Abdominal Surgery in Canines and Felines."

ABDOMINAL SURGERY IN CANINES AND FELINES

By A. Trickett
Kansas City, Mo.

The subject matter in general is one that has not received the consideration it deserves from the average general practitioner. Outside of the larger cities the calls for the veterinarian to treat dogs either surgically or medicinally are not frequent; consequently the interest in this class of patients is not great, unless the individual practitioner is somewhat of a dog fancier.

Again we find in our college work that only a small number of students take a serious and studious interest in the treatment of dogs, with the result that after graduating and opening a place of business and a call is received to attend a dog the practitioner makes such a poor showing in handling and making his examination that the owner becomes dissatisfied and usually tries to do his own work thereafter, and through the practitioner's neglect brings into disrepute the whole profession.

It behooves us as practitioners to become just as expert in handling and just as familiar with the general habits of dogs as with any of our larger patients. In other words, if we are not familiar with the dog's actions and habits in health, how can we hope to be expert in diagnosing their ailments.

Abdominal surgery as applied in this article will include any operation in which instruments are used to enter the abdominal or peritoneal cavities or for repairing the injured wall of same.

First to be considered are the indications for operation. In this particular it would be well to keep in mind the simple and comparatively short alimentary canal, the ease with which dogs may expel contents of the stomach, and also the ease with which the whole alimentary tract may be washed out. If these characteristics are kept in mind it will enable the practitioner to overcome many conditions without resorting to operations.

History plays an important part. Frequently the owner will inform you of the animal's playing with foreign objects and accidentally swallowing them.

No operations should be attempted without first preparing the patient generally, and the field of operation locally. I think it has generally been thought proper to operate only as a last resort. I think this should be governed by a careful examination and noting the condition of the patient. Many animals are lost from putting off operating until the last possible moment. At such times the patient has become weakened either from infection or pain until there is nothing to be expected or gained from the operation but the fee. For instance, dystocia and penetrant wounds of the intestines from external or internal injury should certainly receive early and prompt attention if favorable results are expected. Even when every precaution is observed the outcome is not always satisfactory.

INDICATIONS FOR OPERATION. The presence of foreign bodies in the alimentary canal or removal of new-growths from this canal or any of the adjacent organs.

The removal of diseased portions of canal or other organs not due to new growths.

The removal of biliary, renal or cystic calculi.

The ordinary operation of ovariotomy.

The removal of fetuses when unable to remove through the usual channel.

External wounds of any character and the opening of the cavity as an exploratory medium when the nature or cause of disturbance is not determinable.

CONTRA-INDICATIONS. Very old animals, which are usually found to be suffering with either pulmonary or heart disturbances, frequently with both.

When there is a general infection present, either from a specific infectious disease or from invasion of infective material or from local infection.

When there is extreme exhaustion from any cause, or when malignant new growths are present.

We find in our clinic at the college and in our practice generally that the character of abdominal wounds depends very materially upon the breed of dogs. For instance, in fighting dogs—bull-terriers and pit-dogs—we find lacerated wounds made by the teeth, sometimes severing all of the abdominal coverings; in hunting dogs, lacerations or punctures from wire or other sharp objects; in the smaller breeds—fox terriers, pugs, spaniels and toys—the abdominal injuries are usually due to being caught between doors, stepped upon, or run over by vehicles of different kinds. In this type of injury there is usually no laceration of the abdominal walls. The larger breeds—St. Bernards, English mastiffs, Newfoundlands and Great Danes—seem to be almost immune from abdominal injuries, also to the ordinary conditions that call for operation in smaller breeds.

The removal of foreign bodies or non-malignant new growths from abdominal intestinal canal, or the adjacent organs, should always be performed under general anesthesia after careful preparation of the patient, such as emptying the alimentary tube and carefully cleansing the exterior of the patient, especial attention being given to the site of incision.

In preparing patients for operation or general anesthesia, are there any advantages to be gained by first giving agents such as morphine, chloral, cannabis indica, etc., and what are the safest agents used to complete anesthesia? Again, do such agents as morphine have an influence on the control of hemorrhage? It has always seemed to me to be harder to control hemorrhage after the use of this agent; also, I find the response in case of collapse during the completion of anesthesia much slower and unsatisfactory where these agents are used.

In operating in emergency cases where there is internal hemorrhage, badly bruised tissue, rupture of some of the abdominal organs, or penetration of organs from external or internal sources, it is not always possible to wait for a general emptying of the alimentary tube, but the operator should take time to cleanse the site of operation and thoroughly cleanse the cavity after operating, before suturing the abdominal walls. The abdominal organs may be freely cleansed with a warm normal saline solution, without any bad results. It is really surprising how much bruising of the peritoneal coverings of the different organs there may be present, without any serious form of peritonitis resulting.

In closing incisions or wounds through the abdominal walls by suture, care should be used in seeing that the peritoneum is enclosed, and that the omentum is not included in sutures. These two conditions, I think, give more trouble than any others that I know of. The first, when the peritoneum is not closed, results later in hernia, while the latter is followed by a tenseness of abdominal walls and a general tenderness of abdomen with disinclination of animal to take exercise.

DISCUSSION

Dr. Adams: Gentlemen, those of you who are interested in the surgery of small animals certainly have some problems that you would like to settle. I will call on Dr. Kron, of San Francisco, to open the discussion on this paper.

Dr. Kron: There is one point that Dr. Trickett brought out, on which I agree with him thoroughly, and that is in the use of morphine. In spaying dogs I do not think I have used an ounce of chloroform or ether in all the time I have been operating. I fix the dog in the usual way, giving him physic, etc., and I give a dog that is over 25 pounds, a grain and a half of morphine an hour before I am going to operate. I make the hole about an inch long, grasp the ovary in the usual way, and when I sew up, all I take is the peritoneum and the muscles. I put in a piece of iodoform gauze, and in eight days I send the dog home. For the outside skin use Mulford's or any antiseptic powder you wish, sprinkling it on cotton, and put on a bandage and leave that on for two days and then dress it. I get fine results. I think I get very little hemorrhage, and I think it is due to the morphine.

Also when I cut ears I do the same thing. I give a dog a grain and a half of morphine. I have a table for holding the dog, which has four holes in it. I take the dog's legs and tie them down to the bottom; there is an arm on the table that comes up in this fashion (motioning). My dog's head looks right at me. I cut his ears, put on a bandage, cutting holes out for the eyes, and leave that on for three or four days. I never would operate on a dog's ears until he is nine months old at least, and I never yet have had to tape a dog's ears in any way. Sometimes if I get hemorrhage I will sew them; but I will not operate on a dog until he is at least nine months old.

Dr. Adams: I would like to ask whether the age of the dog or the condition of stiffness of the cartilage of the ear is the thing that you are guided by?

Dr. Kron: The latter is what I am guided by.

Speaking of calculi in the bladder, there is an instrument, gentlemen, called a lithotrite, made for children, which you can take and crush many a stone that you will not be obliged to operate on. Many times when asked to operate I have been able to break up the stone in that manner, and I have had the dog go home in two weeks. This instrument is 9 in. long; it has a forked appearance, and has a little hammer-like arrangement on the end of it. It is made for children.

Another thing that a man in canine practice will find of great advantage, if he will get a great many different sizes (they come in ten sizes), is the human speculum, especially for the cat. For the cat get No. 1. It is an instrument that is round, with a wide base. You put that right in the animal's mouth and it holds down his tongue, and you can put your two fingers in there very easily, especially to get fish bones or needles out of cats' mouths. I have found it a great help. Also I had a finger made out of brass with three joints in it. A dog can bite on it as hard as he will, and he can't bite your finger. I never use a speculum for that purpose. If he bites you, let him bite; he bites on this brass knuckle that fits over the finger up to the metacarpus. A man in the canine practice will find that very useful.

A VOICE: Why did you have that made?

DR. KRON: I had it made for myself. It is similar to the armor plate that was so popular in early days. It has got a knuckle here and a knuckle there, and it leaves just that much of your finger out.

DR. MERILLAT: Please describe that a little better, Doctor. I do not think we all understand it. I believe that is quite a unique instrument.

DR. KRON: Well, I had seen a doctor use one of them, and I got the idea from him. It is made of brass. Aluminum is not practical; it is too soft. You know how they make armor plate for a man's knee? It has a joint in it; the joint is flexible, and there is a joint here and a joint there; it is hinged right here and hinged there; the finger will bend. Of course you can't pull anything out with it, but if you wish to see if there is a bone you can feel the bone through the end of your finger. You may get nipped a little on the end of your finger, but he can't bite you. With a big bull terrier I don't care how many speculums you put on him, he will get them off, but he can't bite through this brass. Mine is made out of polished brass.

A VOICE: How is it jointed together?

DR. KRON: On a little hinge.

A VOICE: One laps over the other?

DR. KRON: Yes, one laps over the other. That is it exactly. Any instrument maker will make it. He charged me five dollars in San Francisco for making mine.

But you will find in cat practice that if you just ask for a set of human speculums that they are fine. It is just exactly like this. This holds down the animal's tongue, and this is right around his mouth. No. 1 is the proper size for an Angora cat. If you happen to be alone with the cat, and a woman is going to hold him, and she gets frightened and lets him go, you get scratched.

Another thing I have: I had my mother make me a bag out of canvas, with regular draw strings. You put a cat in that and he can never get away from you.

Now, to castrate a cat, I wrap it up in a blanket and it will never bite. That is not my idea; that is Dr. Miller's, of New York City.

DR. ADAMS: Don't you know how to hold a cat without putting him in anything?

DR. KRON: Why, certainly; take his two hind feet and his two front feet; but it isn't everyone that is willing to do that; if you have him in a blanket the fellow thinks he is protected. You go to a man's house and you ask him to hold a cat and he says: "No, sir, I won't, but if he's got him in a blanket he thinks he is perfectly safe and he will very willingly hold him.

DR. ADAMS: I wish to ask Dr. Trickett a question before we drop the subject, and that is, what antiseptic do you use for cats, for instance, for oöphorectomy? That is, how do you prepare the skin? Do you use antiseptics for preparing the skin? Do you use sutures, and do you ligate the body of the uterus?

Dr. Trickett: In the case of the cat, the same as that of the dog, I always wash her off. Every time that I have sutured the skin, my cat died; I had infection. I just put a bandage on. Every time that I have ever sutured the skin I have had trouble and I have lost them. I have done about five hundred, and I send a dog home in eight days, and I get $25 for doing it.

Dr. Adams: Cats, too?

Dr. Trickett: Cats, too. Don't feed your cat solid food; feed her nothing but malted milk. You start in and feed her solid food and you are going to have trouble every time. I feed her warm milk.

Dr. Adams: Well, I am glad to hear you say that, Doctor, because that is in accord with my own experience. Sometimes we operate on a dozen cats and do not lose one, and then we have four or five and lose them all.

Dr. Kron: I want to tell you one thing, gentlemen. Be absolutely sure that your cat has been physicked out thoroughly. I find the nicest thing is Mulford's cathartic No. 1. Give two each day.

Dr. Adams: We usually prepare the bowels with calomel and soda, and then we use alcohol on the skin. We pinch off the suspensory ligament of the ovary, and pinch off both horns of the uterus, and do not put any suture in; we put no suture in the skin. Then we put a binder on the cat and we feed it malted milk, and we send it home the next day.

Dr. Williams: Now, gentlemen, we will have to pass on; the time is fleeting.

The first title on the afternoon's program is, "The Scope of Abdominal Surgery in Animals," by Dr. F. Hobday, of London, England. He could not be here, and he has sent his paper, which Dr. Merillat will read.

Dr. Blattenberg also contributes a paper. Dr. Blattenberg is with us, and we shall be pleased now to hear from him.

THE SCOPE OF ABDOMINAL SURGERY IN ANIMALS

By J. H. Blattenberg
Lima, Ohio

We might look over the rapid stride and progress of abdominal surgery of the human subject, in order to compare at a glance the slow progress at which abdominal surgery of animals is plodding along.

A prominent physician and specialist recently said that any book over fifteen years old, on surgery or medicine, in the library of a practising physician should be consumed by fire or thrown in the attic and left to mould with continuing age owing to the progress of surgery and medicine, especially the latter, within the last decade.

We look farther back in history to late in the sixties, when Lister discovered the great value of antiseptics, previous to which mortality stood at about 50 per cent. and following the discovery of antiseptics and the employment of same in the rather crude manner in which they were put to use, the mortality dropped to about 15 per cent.

Since the discovery and proper use of this most priceless adjunct to surgery in the human subject, the advancement has been astounding, and invasions into the abdominal cavity, be it exploratory or major operations requiring the greatest skill, are undertaken daily with little hesitancy as to fatal results.

To what can we attribute the poorer progress of abdominal surgery in the lower animals by veterinarians with the advantages at command of living and dead subjects and almost free from the criticism of our investigations, and the benefit of the experiences of the surgeon who so successfully opens the abdomen of the human subjects.

It is not the lack of interest or craving desire of the veterinarian to bring about, so far as he has been taught, that which his experiences and that of others have enabled him to do as skilfully and thoroughly as possible.

It is not that all the ability along surgical lines has fallen to the hand of the surgeon who very skilfully carves his way so deep in the abdomen of the human subject as well as carves his way so high surgically.

It is not that the limited operating done in abdominal surgery of the lower animals cannot be done quite as skilfully as that done by the surgeon to the human subject in similar operations.

It is not in all cases from the lack of knowledge of antiseptics and sterilization and cleanliness in abdominal surgery of animals.

It is not from the lack of knowledge and thoroughness of those who present the text along the lines relative to this subject.

The difficulties of diagnosis of operative surgical conditions, especially early diagnosis, can be one of the attributive causes of the backward condition of abdominal surgery of animals.

What is more essential along these lines in the human subject than a Doctor who is a good diagnostician though he be unable to execute many surgical maneuvers, but is able to judge with few exceptions the "why" and the "how?"

Many an able surgeon is not regarded as a diagnostician equal to his surgical ability and does not rely wholely upon his own judgment previous to operation.

Considering advantages and opportunities as veterinarians, do we improve them as we should by looking deeper into the causes and searching why a fatality was so, and what would have been done had we an opportunity to retrace? Do we take too much for granted or jump at a conclusion too often?

We note surgeons to the human subject who will spend a certain amount of time each year devoting their attention to certain clinics; they may go abroad in search of that knowledge that they recognize themselves deficient in, for it requires work and study to gather that knowledge along the line in which one desires to attain greater proficiency.

Can we call abdominal surgery in animals crudeness? Parts of it we can; it should be recognized in its true light. Truth is mighty and should prevail. Not along all lines of the surgery of animals can it be called crudeness; far from it.

Can we lay this condition to the standard of veterinary education not being placed sufficiently high? Some surgeons succeed to a certain degree, but there are hindrances insurmountable such as handling and controlling our subjects, especially the larger ones.

There is such a vast contrast between the patient of the human family and the surgical patient of the lower animals, especially when it relates to abdominal surgery, and the success which may or may not follow.

The man who devotes his attention and study to abdominal surgery in the smaller animals makes remarkable showing for his efforts, just as much so as is done by the skilled surgeon operating upon the higher order of animals providing the former maintains a conscience for asepsis and cleanliness. But to apply this proper observance of cleanliness and asepsis to all the lower animals is almost one of the insurmountables in major operations, with few exceptions.

Following a surgical operation in the human, the patient returning to consciousness, permits his or herself to be governed by command and not often by restraint unless mentally unbalanced. Even then they can be kept under control to a greater degree during convalescence than the subjects of the lower order having undergone abdominal surgery especially the larger animals for they will not permit being left in a recumbent position except by restraint, which position they will scarcely if ever assume only by force, unless vitality is insufficient to support standing. Recumbency is the unnatural position except at rest or during acute pain but this should be the position of large animals to aid in convalescence following operative surgery of the abdomen. The external abdominal walls at some part are continually weight bearing and the patient is not easily controlled by command of attendant who would order the patient to lie on the opposite side to the seat of operation, as human subjects do who obey attendants to the betterment of their condition by the position they assume.

The question of sentiment is seldom taken into consideration in the employment of surgical work of the lower animals, yet occasionally from a humane standpoint a veterinarian may be employed along this line of work. But to view abdominal surgery of the lower animals as it really is and the manner in which it is employed, we must take it from the cold commercial side, the economical point of view, which when it proves successful, leaves our subject more serviceable, salable or reproductive unless it belongs to the smaller animals and on these the greatest success has followed and a more correct diagnosis has been proved by abdominal surgery.

The refined technique of some of these operations requires the skill and knowledge of a specialist who is recognized as one having devoted his time, skill, and hard study to diseases of some one or more particular parts of the anatomical structure.

There are veterinarians in certain sections especially the larger cities who devote much of their time and attention and become quite skilled in abdominal surgery of the smaller animals; they become worthy of note and we look to them as specialists along certain lines of this field to which they have given special attention.

Then there is the opportunity for the man whose work carries him into the rural and stock-raising districts; he has opportunities to direct his work with special attention to abdominal surgery in the larger as well as in some of the smaller animals, yet he does not have the good results following his work along abdominal surgery that the veterinarian in the city who has devoted his special attention to the smaller animals. This is due partly to the much greater ease the smaller animals can be handled, the greater care and attention given, which will not be near the efforts wasted during the convalescence of the larger animals. Besides, the smaller animals will take better care of themselves during this period of much needed rest and quietude than the larger animals. It is only under the less favorable circumstances that the veterinarian's attention can be given the larger animals following his surgical work, unless the animal can be placed under his personal care or supervision in his own institution kept for this purpose.

As to comparing the specialist along surgical lines in the veterinary field with the surgeon who specializes on the human subject, you must lay parallel the great numbers of the human family and the many ills the abdominal cavity is heir to which require and receive special surgical attention, if there be a parallel with the operative subjects of abdominal surgery in the lower animals. It is expected of the general practitioner in veterinary surgery to cope with the many and the less frequent conditions met with in the every-day practice so that he can hardly be expected to specialize on any particular line of work. Operations most frequently met with in the abdomen and its walls are handled very well by the practising veterinarian or a fellow practitioner within a close communicating distance who may devote extra attention to the surgical side of veterinary work.

Conditions more frequently met with are wounds without and with visceral injuries and mostly brought about by contusions of the abdominal walls. When due to a sudden blow or severe crush they should always be regarded with seriousness and may be complicated with great internal injuries, a lacerated peritoneum or subperitoneal tissues. A very serious and frequent complication is rupture of one or even all of the abdominal muscles including the abdominal tunic at point of contusion; the viscera may be supported by the skin alone, which is frequently broken, permitting a protruding bowel. Many a surprising recovery follows the careful cleansing and trimming of the shredded edges of the broken wall with the proper suturing of these broken walls to their proper position. These walls also give an external support but you should not overlook the most necessary of all, namely, drainage. Too many an unfavorable prognosis is given without an effort in the right direction. It requires no particular ability to end the life of an animal suffering from a severe abdominal injury but it requires a much greater effort and ability to put into effect all of one's knowledge and experience of like accidents or injuries and work it out to the best that can be done.

Herniæ are not so uncommon and many time necessitate being reduced by surgical methods. The veterinarian who more frequently comes in contact with this branch of abdominal surgery finds his work extending mostly in the rural districts. A great many foals are born with scrotal or umbilical herniæ of considerable size, which spontaneously disappear occasionally, but more frequently necessitate surgical work. At the same time when operating on a scrotal hernia the seminal gland is often removed but occasionally this gland is permitted to remain when the subject is greatly desired for breeding purposes.

Occasionally a strangulated hernia becomes reducible by traction and scrotal manipulation, otherwise this will require surgical assistance. Young animals recover very rapidly following the operation. Umbilical herniæ are rather common in foals and many times disappear spontaneously and yield quite readily to the inflammatory process brought about by the several surgical methods employed for them. In many of the smaller animals greater results have followed by obliterating the hernial sac. The recurrence of this hernia is sometimes noticeable in the small as well as in the large animals.

Ventral herniæ occurring in any situation other than already mentioned may be spontaneous or traumatic; the latter is very often operable in both large and small animals, while the former in a great many cases is the better for having gone undisturbed other than by giving external mechanical support.

Cesarean operations are less frequent in abdominal surgery, especially in the larger animals, but when performed upon the smaller animals (particularly the sow and the bitch) with the necessary care and cleanliness and sufficiently early they are usually followed with success.

The larger animals present peculiar conditions, and rules which would be successful in the smaller animals are rather difficult to follow with as good results in the large animals.

Oöphorectomies are performed upon almost all the domesticated animals very successfully. This is one of the surgical operations of the abdomen of large animals which is performed with considerable degree of success when compared with like operations on the smaller animals. On the other hand, other operations have proved very successful on small animals and like operations on the large animals are not so successful owing to the handling, care and control of them.

Gastrotomies are performed in abdominal surgery in animals, but few such operations are performed in the larger animals with as much success as gastrotomy in the smaller animals, especially the dog. It is not uncommon with the surgeon who has an extensive canine practice, to perform gastrotomy for the removal of foreign bodies from the stomach.

Enterotomies are not unknown in abdominal surgery in animals, but like gastrotomy they are confined mostly to canine practice for the removal of foreign bodies from the stomach and the breaking down of intestinal adhesions.

Aspiration of the stomach of animals is employed to a large degree, though confined to the equine subject, which is most frequent in urgent need of immediate relief owing to the peculiar anatomical arrangement of the cardiac opening.

Gastric paracentesis is occasionally performed but without any marked degree of success other than the display of the skill of the operator.

Enterocentesis—what a life saver this has been to the equine subject! The operator who least hesitates with a "trocar and cannula" when a critical situation presents itself, and who is ever mindful with all his promptness of cleanliness, has fewer regrets than he who loses time waiting at the post with the horse.

High enemas or colonic lavage may be classed under this subject, as by this mechanical process of liquid distention or dilatation very grave conditions have been altered.

Lithotomy is not an infrequent operation and is performed with as much skill usually on animals as the surgeon operates on the human subject and is followed with as good results. Upon the larger animals the operation of median lithotomy is performed as a usual thing with little difficulty in the standing position, while that of the smaller animals, especially in male dogs, this requires suprapubic lithotomy. The operation of lithotomy is much less required in the female than in the male, greatly due to the shorter and more dilated urethra in the female and the absence of the prostates.

Cryptorchidectomy is within itself an abdominal operation confined to animals. An undescended gland does occasionally exist in the human subject, but what sane person of the male gender is going to seek the services of a surgeon to the higher order of animals to have an undescended seminal gland removed though it be functionless.

Farmer Miles back in history brought out to the veterinary world that this could be done before antiseptics and cleanliness were thought to be the essentials of success following any abdominal operation. Farmer Miles' technique has not been improved upon to any particular degree; a few things in detail have been worked out regarding the location of field for operation, unfavorable surrounding conditions, a restless subject, fighting against restraint and convenient place for the operation. Cryptorchidectomy is performed with very good success aside from the peculiar accidents which are possible.

Rumenotomy is confined almost exclusively to the bovine subject and is performed under unfavorable circumstances and conditions. In nearly every case the operation is conducted far from any place of deliberate preparation and yet is not performed nearly as often as should be, and without hesitation. It is remarkably successful when considering that the seat of operation following rumenotomy has to be left to nature most entirely with its wonderful resisting power to assist in the recovery. Rumenotomy is not performed as often as is possible. This operation should in extreme measures be resorted to more frequently and usually is a safe expedient.

We hope the obstacles which impede to a degree the progress of some of the abdominal surgical operations of animals, may be overcome or greatly lessened by those who give and devote their efforts and resourcefulness along these lines.

Dr. Adams: Dr. Hobday has written a communication to us on this same subject. I will ask Dr. Merillat to read Dr. Hobday's paper, and then we will have whatever discussion there may be on the two papers, because they cover the same subject.

Dr. Merillat: Mr. Chairman and gentlemen, I have the honor of presenting here a paper by Frederick Hobday, F.R.C.V.S., of London, England. Those of you who attended the American Association two years ago, had the pleasure of meeting Dr. Hobday, who journeyed across the Atlantic at his own expense for the purpose of coöperating with our own Prof. Williams, in presenting to you the subject of roaring in horses, and whose paper and discussions and whose operations go down in the history of this Association as some of its very splendid works. Although Prof. Williams had his work published by the Association in 1896, it was only after this conspicuous presentation of the subject at Toronto that the American veterinarians took up the subject of operating upon roarers with a new zest. They have now standardized the work, to the great credit of Hobday and Williams. Again, at our solicitation, Prof. Hobday has consented to present a paper to this Association, and with his regrets that he could not be present. I have a letter here from him, addressed, London, July 20, 1913, reading as follows:

"Dear Professor Merillat: I very much appreciate the honor which the American Veterinary Medical Association has done me through you, in asking me to contribute a paper before the members.

I hope the inclosed will be suitable.

Please convey to those present my regrets that I cannot again be present, and say that I wish the meeting every success.

Also, do not forget to state that we in England are looking forward to the pleasure of seeing a very big contingent of our American brethren at the International Veterinary Congress, in London, next year.

By the time that arrives I suppose most of you will be quite prepared to come across by aeroplane.

Yours sincerely,
Frederick Hobday."

THE SCOPE OF ABDOMINAL SURGERY IN ANIMALS

By Frederick Hobday, F.R.C.V.S., F.R.S.E.
London, England

Introduction. Any operation which involves entrance into the abdomen of an animal is, above all others, the crucial test of the value of the applicability of antiseptics to surgery. Much more is it the case in an animal patient than in a human being; for the latter can be placed under such perfectly adapted and clean surroundings afterward that if septic infection does occur it nearly always commences either before or at the time of operation; whereas in our patients we have not only this to think of, but the much greater risk of after-infection from the surroundings to which we are compelled, of necessity to return them.

You all know what incomparable advantages our medical confrères have when operating, as compared with ourselves. Qualified assistants and nurses to hand, a warm room, or lavishly fitted operating theatre to work in, an expert anesthetist, a profuse supply of laundry appliances, towels, cloths, etc., hot and cold water supply, a patient amenable to reason and capable of expressing gratitude, and finally a nice clean bed, with night and day attendants to see that no false step is taken which might interfere with a satisfactory sequel. Under such conditions we, too, in veterinary practice, could achieve an equal proportion of successful results, but with animals, abdominal surgery must always, I fear, have its limitations. The question of the value of the patient and its practical utility afterward have generally to be taken into account, as this settles many cases before they come to operation, the shotgun or the chloroform bottle taking the place of the scalpel.

I have now had personal experience of more than 1000 operations on horses, cattle, dogs and cats, in which it has been necessary to enter the abdomen, and it is mainly in connection with these that I desire to exchange experiences with you today. Ovariotomy of the pig I am leaving almost without comment, as the wonderful results in this respect which are obtained by even the common castrator, are too well known to be commented upon. It is sufficient to say that the abdomen of the horse and dog species would not stand the same rough treatment without a very large percentage of mortalities.

I propose to invite an exchange of ideas upon the successes or failures we have had in abdominal surgery under the following headings:

Simple puncture and suturing for accidental wounds.
Simple laparotomy, gut-tie, and reduction of herniæ.
Operations on the stomach and intestines.
Operation on the abdominal urinary organs.
Operations on the internal genital organs.

SIMPLE PUNCTURE. This operation is performed for ascites, an ailment much more common in the dog and cat than in any other of the domestic animals. Insofaras the operation itself is concerned, provided the usual antiseptic precautions are taken, there need be no fear of performing it, but my own experience of a permanent recovery in cases of abdominal dropsy have been very discouraging. In ascites, as a rule, the fluid returns and eventually causes the death of the patient.

Accidental wounds are met with in all animals, particularly the horse and dog, and all of us must have had experience of an abdominal wound with protrusion of intestine. In the pre-antiseptic days the majority of such animals would at once have been put away as painlessly as possible, but experience nowadays shows that such wounds are, in by far the majority of cases, well worthy of a trial. In the horse quite a large number of observations in which bowel was visible through an abdominal wound and in which parts were sutured even some hours after the infliction of the injury, have been recorded in veterinary literature during the past few years.

LAPAROTOMY; GUT-TIE; HERNIA. Laparatomy may be performed as an exploratory measure with a view to finding out the condition of things in the interior of the abdomen, and it is, of necessity, of course, the preliminary step to any operation involving attention to the organs inside. It is also useful for the removal of tumors and other disease conditions.

The hand of the operator may enter the abdomen through the abdominal muscles, through the linea alba, up the inguinal canal, or *per vaginam*.

Experience teaches that where it is possible, especially in small animals, the linea alba forms the safest and least troublesome site of entrance for an exploratory laparotomy, but at the same time the operator must be guided to some extent by the animal upon which he is working, and the position of the organ he seeks. For example, when seeking for a missing testicle in a cryptorchid horse the inguinal region is, naturally enough, the site chosen for the laparotomy, and one may either dilate the inguinal canal itself or adopt the safer method of breaking through the abdominal muscle alongside of it. Again, in removing the ovaries of vicious mares, one may gain access to them through the flank or the vagina, the latter being, however, generally admitted now to be the safest and best; and in cats, experience has taught me that the flank method gives the best results because of the crouching position assumed by this beast when put into a cage. I have known adhesion of the intestine or omentum to the abdominal wall when the wound was made below, whereas with the flank incision the intestines naturally fall away from the wound and are not in direct contact with it for any length of time continuously.

The linea alba can be incised almost bloodlessly and the edges of the wound lend themselves very satisfactorily to the application of sutures and to direct union.

This is not, I believe, the generally accepted opinion, and I recollect well that as a student I was always warned not to make my incision there and was given to understand that the wound would not heal readily and that the parts were weak. The exact opposite has, however, been my own experience after a very serious and prolonged trial in which I have incised down the centre of this part several hundreds of times.

The healing of the laparotomy wound gives, as a rule, quite a satisfactory sequel, and it is astonishing how much exploration an abdomen will stand, provided ordinary care is taken when handling the organs and that strict attention has been paid to antiseptic details.

The operation for gut-tie in cattle is one which comes under the heading of laparotomy and one which is frequently performed with most gratifying results.

The operation for hernia may conveniently be taken under the heading of laparotomy, for, practically speaking, the radical operation for this condition is really only a modified laparotomy.

Once the organs are returned to the abdominal cavity it needs only a convenient selection of suture methods to keep them there securely. The limitations of abdominal surgery in this condition depend mainly on two things: Some herniæ are inoperable on account of their size and the extent of the adhesions, and others on account of their position. Some ventral herniæ in horses become very large, and for this reason and on account of the risk of prolapse of the gut afterward, if the animal is at all workable it is sometimes wise to think twice before advising operation.

Inguinal hernia in the stallion and dog are often difficult to put right if it is desired at the same time to preserve the descended testicle on the same side. If the testis is removed the covered operation does away with a lot of this difficulty.

Operations on the Stomach and Intestines. Any operation which involves cutting into the stomach or intestines of an animal is always serious, and the gravity of it should always be explained beforehand to the owner. Such operations are usually a necessity, and the only alternative to adopt before they are discussed.

It is in regard to the horse that I particularly ask for an exchange of information. In the dog and cat no one will now deny that operations for the removal of foreign bodies from the stomach or intestine are possible, although even in them the proposer must always be guarded; and the ox will bear rumenotomy sufficiently well to make it an operation constantly resorted to by practitioners in country districts; but the exploration, after surgical incision of the stomach and intestine of the horse is as yet very decidedly in the experimental stage. Even the boldest and most enthusiastic surgeon will think twice before he suggests to an owner that the abdomen of a horse shall be opened and the twist of the intestine, which he knows to be present, shall be unravelled, or that the calculus, the position which he may perhaps be able to exactly locate, shall be removed from the intestine by laparotomy and bold incision directly upon it.

Personally, I have within the last few years twice attempted to reduce a twist of the bowel and six times have attempted removal of calculi from the horse. In each the result has been failure. I am disposed to be pessimistic over surgical interference in this animal for these two of its commonest and most painful and fatal ailments. The large bulk and weight of the organs to be manipulated, the necessity for doing it under antiseptic conditions, and the fact of one having to work in a very confined space, render the task an utterly hopeless and impossible one in the case of a twist of the bowel, and indeed the tangle into which a horse's bowel will get is most extraordinary; so much so that it is often quite an impossibility to replace the gut into its normal shape even when the bowels have been removed from the body. I have tried by laparotomy of the flank and, in the mare, *per vaginam,* and I have no hesitation in putting it down among the impossibilities of veterinary practice.

Laparotomy for calculus of the bowel, too, must, I fear, be relegated to the same category, as I do not know of a single recorded case where it has been successfully done. That the healthy, small intestine will stand surgical interference has been demonstrated by several observers, but unluckily it is not in this part where we meet intestinal calculi, and I found that the chief cause of failure was to be found in the fact that I was utterly unable in any of the six cases in which I operated to get the large bowel containing the calculus to the orifice of the wound. Calculi are usually lodged in the large intestine, and I have been unable up to the present to find a single recorded observation where any surgeon has been successful in removing, by incision, a stone from this part of the gut. When the stone was in the large colon I found that it was a physical impossibility to withdraw the organ through a wound of safe size for promise of satisfactory suturing afterward, for one must not forget that the wound one makes has to remain a weak spot with a large weight of bowel pressing upon or against it for some time. The wall of the large colon, too, does not lend itself well to the application of sutures, and the extreme weight of its contents make it apt to readily rupture. The fluidity of its contents, too, make septic infection very easy.

If the stone has passed out of the large colon (and this is usually the case before a stoppage of the bowel takes place), then it becomes jammed in that comparatively narrow lumen which is attached to the lumbar region before actually becoming rectum. Here, again, it is impossible to withdraw the portion of gut so as to bring it into the orifice of a flank wound. I have tried to get at this both by flank incision and *per vaginam*, but, so far, with only failures to report. I believe this, too, to be impossible.

I do, however, believe that there is a future in front, with a prospect of success in a few cases, of the attempt to assist the calculus to move one way or the other, and to get it away from the narrow place in which it is jammed. One horse in which I did this survived for fourteen days and then died of a lung trouble quite unconnected with the original ailment. Especially do I think so now that one knows the vaginal mucous membrane will stand puncture so well when first rendered surgically clean by antiseptics.

For a stone just a shade smaller in circumference than the bowel I feel sure that with the operator's arm in the abdominal cavity and an assistant manipulating per rectum it will be possible to bring the stone away. In the cases in which I tried it the concretions were large and I could not do it, so I contented myself with forcing the stone back again into the large intestine where it had plenty of room to move about and where it must have lain for some months previous to the attack of colic. The relief of the pain was immediate and well marked in each case, although, as I have already observed, none of my patients made permanent recoveries.

Bowel surgery in the horse will always, I fear, have its limitations very strictly defined. It will be a merciful boon to the equine species if someone can devise ways and means to get over the enormous difficulties in this direction.

OPERATIONS UPON THE ABDOMINAL URINARY ORGANS. Although always to be considered seriously, I do not think we need discuss operation upon all the urinary organs as impracticable or impossible. It is in the horse and dog that surgical interference is most likely to be called for.

No one nowadays will deny the practicability of removal of stones from the bladder, and successful results in both horse and dog have frequently been recorded by numerous observers. Calculi are frequently removed from the bladder of both dog and horse and the proportion of successful results is such that when done by an expert the operation is always worth advising.

When in the kidney the difficulty lies in accurate diagnosis. Operations in the small animals are possible both for removal of stone and for removal of the whole kidney, but in the horse I believe that here again we come to one of our limitations.

OPERATIONS ON THE INTERNAL GENITAL ORGANS. Here, above all others, may the animal surgeon claim success. The generative organs of the calf, pig and bitch have been interfered with successfully by the common castrator for many years and in the operations for oöphorectomy and ovaro-hysterectomy they are very expert. The mare and cow have also received their share of attention and, provided due precautions are taken with reference to surgical cleanliness, the operation for ovariotomy can also be performed upon them with an almost infinitesimal risk.

Provided scrupulous antiseptic care is taken an expert operator may remove the ovaries from the mare, cow, monkey, bitch, sow and cat almost with impunity, and the same may be said in regard to the removal of the male or female generative organs from birds; this operation is now being done to quite a large extent in ostriches in South Africa. (See Mr. Stanley Elley's article in the *Veterinary Journal* for August of this year.) In fact, it is astonishing how little notice the patient will take of this operation afterward if even ordinary care is exercised throughout the operation and convalescence. The cat is the only one of the above patients about whom I have ever had any anxiety afterward; cats are curious animals at all times and often refuse to feed on the slightest thing being done to them. Removal of the uterus and ovaries, too, is well borne by the bitch, and the cat stands this operation quite as well as the removal of the ovaries alone. With a healthy uterus the risk in the bitch is infinitesimal, either when the ovaries alone are excised or the ovaries and uterus, either when empty or pregnant. Out of the 300 consecutive cases of most of which I have the records I have never lost but one and that was indirectly attributable to other causes and not to the operation.

The pregnant uterus can be removed successfully either before the time due for whelping or even after the act has really commenced. I speak now from an experience of more than 70 cases of this kind, and I have often been astonished at the entire absence of constitutional disturbance, provided septicemia has not already made progress before the operation is done. Only recently I have had, in consultation with other veterinary surgeons, experience of two typical cases of this kind. One patient had been in labor for two and a half days, and five puppies had been removed by the natural passage, but the sixth was retained and had remained at the top of the left horn of the uterus, this organ being much distended with septic gases. Laparotomy was performed, the whole uterus and contents were excised and the bitch has made an absolutely uninterrupted recovery. The veterinary surgeon with whom I operated in consultation wrote to say that the most noticeable feature she showed afterward was to grumble because she had no puppies to suckle and to wander round to seek for them.

The second case I alluded to is one of a bitch with her uterus full of pus. This was carefully excised without escape of any of the contents and she, too, has never shown any constitutional disturbance whatever.

As showing, too, how little notice may be taken by an animal when strict asepis is preserved, I recollect well one case in which a cat had her ovaries removed before her kitten was weaned, and she still continued to satisfactorily suckle it.

Cesarean section, in which the uterus is opened and the fetus removed, is an operation which I dread much more than the entire extirpation of the uterus and ovaries. Recorded observations, however, show that it can be done successfully even in the larger animals and in this connection I would refer you to a case recorded in the *Veterinary Journal* for May, 1906, by Mr. Turtill, in which a dead calf was successfully removed from a three year old heifer and the animal made an excellent recovery afterward. I attempted it in a little Welsh heifer and succeeded in getting the calf away, but the heifer died on the following day.

Removal of the whole uterus in the mare or cow while inside the abdomen is an operation I have never had occasion to attempt, nor yet do I recollect reading of its successful performance, but removal of the prolapsed uterus when projecting from the vagina has been done many times successfully in the cow, bitch and cat. The mare, I believe, usually stands this procedure very badly and rarely recovers afterward.

SUMMARY. Summarizing the above under the heading of my paper, I think we may truly say that the field of work in the direction of abdominal surgery in the domesticated animals is quite a practicable and even, one might almost say, a large one. Operations involving the incision of the abdominal wall may be undertaken by every man who has had a veterinary training and the proportion of losses will be infinitesimal.

The internal generative organs bear surgical interference under certain conditions very well indeed, and surgical operations on the bladder, too, are not out of reach.

Operative interference with the interior of the intestine is always a serious matter, although even that should be attempted when no other alternative presents itself. In the smaller animals the chances of success are reasonable; in the large ones the field is much more restricted and has its limitations.

THE ESSENTIALS TO SUCCESS. Lastly, having decided to operate, let us consider what are the essentials to success. As I said at the commencement of my paper, the successful opening and closure of the abdomen is the crucial test of the value of the applicability of antiseptics to surgery. For any operation involving this procedure we must have surgical cleanliness and to gain this end we must apply ways and means to surgically clean our hands, our instruments, and that portion of the body of our patients which has to be incised.

For the instruments, cotton wool and swabs, there is no simpler or better method than to sterilize by boiling. A clean saucepan can be obtained even at a cottage, and the instruments can be taken direct from that and returned to it whenever they are set down or changed. Or, if preferred, they can be transferred after having been boiled in a solution of some non-corrosive antiseptic.

For the patient the razor must be used to remove the hair, and it will astonish those who have never tried the use of this simple, every-day instrument to see the difference between the healing of the wounds which have had their hair previously removed from the edge by shaving and those in which the precaution has been neglected. And yet, even in these antiseptic days, how few of us consider the razor as an integral part of the operative outfit and find it a regular place in our operating case. In reality, for those who have once used it, it becomes the most used instrument of the whole lot.

The skin is then painted with iodized chloroform or even plain tincture of iodine, without being previously washed, and this is allowed to dry on; the patient then being ready, when anesthetized, for the incision of the scalpel.

In connection with this use of iodine it is worth while to remark here that this is the only treatment I have adopted for the skin in more than 200 consecutive cases of abdominal surgery, in preference to washing, and that I have never once had reason to regret it. Its value as a cutaneous disinfectant is astonishing, and the saving of time by its use, with the certain knowledge that it will act as desired, makes iodine one of the most useful adjuncts of the surgeon.

For dressing and attention afterward, I used to always paint with iodoform colloid, but now I give instructions for the daily dressing of the surface surroundings with iodine, and it is a most rare occurrence not to get a primary union; the sutures being removed from five to eight days later.

The hands of the operator should be well scrubbed in hot water with ether, soap and a nail brush, and scrupulous care must be taken that the hands do not again come in contact with any surgically unclean body until after the completion of the operation. The operator must not touch anything which has not been sterilized, or if he does he must take measures to again disinfect himself.

In conclusion, gentlemen, I ask each of you, in taking up the discussion, to be good enough to bring forward a few actual cases in which you have interfered with the abdomen. Failures are equally as good to learn from as successes, and one and all will help to swell the list of actual statistics from which results may be drawn to increase that knowledge we are all in search of, viz., the best and safest methods to adopt when called upon to relieve the suffering of the animal world.

Dr. Adams: I am sure we have all been interested in this paper by Dr. Hobday. I am very sorry that he could not come that long distance and be with us.

I will entertain a motion that the president of the Association write a vote of thanks to Prof. Hobday for the trouble he has taken in presenting this interesting paper to us. I suggest that merely.

Dr. Merillat: I take great pleasure in offering a motion to that effect, Mr. President. (Seconded and carried.)

Dr. Adams: Now gentlemen, it is five o'clock, and if any of you do not agree with the sentiments that have been expressed in these two papers, now is your time to get up and say so, otherwise we will pass on to the next paper that we have, "Abdominal Wounds of Animals," by J. Victor Lacroix, of Kansas City, Mo. Is Dr. Lacroix here?

Dr. Trickett: Dr. Lacroix is not here, but I have his paper.

ABDOMINAL WOUNDS OF ANIMALS

By J. Victor Lacroix
Kansas City, Mo.

Under this caption may be included a wide range of conditions wherein divers factors are to be reckoned with. In this brief treatise we shall consider the subject in a general way only, mentioning specific instances in the way of case reports, merely for emphasis or to make more clear our meaning.

Our domestic animals are all, because of the manner in which they are kept, subject to injuries of the abdomen. In a general way, the horse and mule are more frequently affected than are the other animals. The fact that horses, used as they are in all kinds of service, exposed to various injuries in the way of runaway accidents, kicking one another when shod with calked shoes; together with the anatomical construction of the abdominal wall, accounts for their being frequently injured. The abdominal wall of the horse is more tense than is that of other animals, and being very agile and quite likely to struggle whenever any vulnerable object contacts the abdomen, they are often seriously injured. The ox, under the same conditions, would suffer little or no harm.

Cattle receive abdominal wounds rather infrequently. They are subjected to contusions probably more frequently than to any other mode of injury. Having thick skins and a rather loose and pliable abdominal wall, punctures and lacerations are of comparative infrequency.

Sheep have abdominal walls that are not tense and in addition the skin is protected by wool. Abdominal fat is usually quite abundant and sheep are not inclined to greatly resist confinement in any position, consequently they seldom suffer from injuries of the abdominal walls.

Swine are not frequently the victims of abdominal wounds. Brood sows with large, pendent abdomens receive lacerations of the mammary glands occasionally, and various complications ensue. This causes the most frequent form of injury in these animals. They may wound one another in combat, or receive wounds from dogs or wolves, but this is not of frequent occurrence. Swine have more or less fat underlying the skin, and they may receive large and deep wounds without particularly making eventration imminent or necessarily a sequel, the result of a post-traumatic necrosis of tissue.

Abdominal wounds are classified variously by different authorities. We shall for convenience here consider them under four different classifications, as follows:

1. Contusions with subsurface solution of continuity.
2. Lacerations without eventration.
3. Wounds with eventration and without visceral perforation.
4. Penetrant wounds with visceral perforation.

CONTUSIONS WITH SUBSURFACE SOLUTION OF CONTINUITY. Contusions with subsurface maceration of tissue occur in horses and mules very frequently. This type of injury is occasioned by any heavy blow which is sufficiently forceful to separate any one of the several layers comprising the abdominal parietes. Contusions that are so directed as to displace relations of the various layers of the abdominal wall, by rupturing tissue, allow of considerable extravasation of blood and serum. Such injuries are accomplished by falls or kicks; by being crowded against door jambs or gate posts; by being bunted by cows' horns, etc.

Manifestation of such injuries may be evident within a few hours after they occur, or they may pass unnoticed until much subsurface extravasation or discharge of fluids has taken place. In some cases only a small amount of blood escapes into the tissues, little swelling occurs at first, and not until infection has taken place is there marked inconvenience manifested by the subject. Abscesses occurring in this manner often contain large quantities of pus, and it is a noticeable fact that such conditions may persist for weeks at a time without perforation of the abdominal wall from necrosis.

To differentiate between abscess of the abdominal wall, where there exists a large cavity filled with fluctuating detritus, and hernia, is not easy in certain cases. In vicious horses where the condition is painful, little is to be learned by palpation while the subject is standing. By casting such animals and placing them in a manner that the swelling is located uppermost, one can exclude hernia by absence of perforation of the underlying structures, and failure at reduction of the mass. Finally with an exploratory trocar or needle hernia can be excluded.

Where such abscesses involve one or more floating ribs, necrosis is more likely to result in perforation of the abdominal wall, and being situated rather more near the superior part of the abdomen, swelling is not so extensive and it is more defined.

Treatment of such cases consists in evacuation of all pus and the removal of shreds of necrotic tissue. Such abscesses should be opened in a manner that perfect drainage may take place and little after-care is necessary.

An extreme case of this kind was treated by the writer in 1906. The subject was a gelding weighing eleven hundred pounds. He was very vicious and the owner had given him little or no attention. Not until the swelling had gradually become larger for about six weeks was any attention given the case. Location of the enlargement was in the left flank, and it extended from the umbilicus to near the anterior iliac tuberosity. The fluctuating center was about twelve inches in diameter. It was not possible to determine the exact nature of the condition without casting the animal. After properly confining the subject, diagnosis was not difficult. The abscess was drained of a large quantity of pus and the cavity irrigated with a weak antiseptic solution. The subject was allowed exercise, but it became necessary to enlarge the opening made for drainage in the course of about a week's time. The animal being difficult to handle, no further treatment was given him, and complete recovery resulted in about a month.

Traumatisms immediately resulting in hernia with more or less subsurface maceration of tissue are met with quite frequently in all animals. Contusions produced by means of blunt objects often result in hernia, because the skin is freely movable and quite capable of withstanding injuries which do violence to the tissues underlying. Subcutaneous rents result in hernia where a sufficient opening in the abdominal wall is produced. Strangulation of intestine may occur and, unless cared for, results fatally. Strangulation usually occurs where the injuries involve the region of the groin. Non-strangulated herniæ are often found involving the floor of the abdomen anterior to the inguinal region.

No great difficulty is experienced in making a diagnosis of such cases, as they occur in connection with some injury and the skin usually bears some evidence of violence, even though it be left intact. By rectal examination those parts of the abdominal wall that are within reach may be palpated and the nature of the swelling determined. Where strangulated hernia exists, diagnosis is not so easily made as in cases of non-strangulated hernia.

Treatment is imperative in cases of strangulated hernia and consists in confinement and anesthetization of the subject. The skin over the swelling is shaved and cleansed with soap and water, dried and painted with tincture of iodine. A free incision is made, exposing the strangulated loop of intestine and the ragged edges of the subcutaneous wound. Repostition is effected by manipulation, after having drained a quantity of fluid with a small trocar. If little fluid is contained, it may be necessary to enlarge the opening slightly. After reducing the hernia approximation of the wound margins is effected by means of sutures.

In a case of strangulated hernia occurring in a twelve-hundred-pound mule, the animal had kicked over a partition and become impaled upon an upright timber. In his struggles there had been torn and badly mutilated a sufficient amount of tissue to allow a hernia of the floating colon. Separation of muscular layers had taken place to an extent sufficient to permit of the incarceration of about twenty inches of intestine.

The writer was called about four hours after the accident occurred. At that time there existed in the left flank just anterior and below the anterior iliac spine an enlargement about ten or twelve inches in diameter, which was œdematous in its periphery. Manipulation of the mass caused pain to the subject. By rectal examination it was possible to outline the irregular borders of this abdominal rent. The animal was very restless and it was decided that immediate surgical intervention was the only recourse.

With assistance the subject was cast and anesthetized, the field prepared, and by means of a free incision the strangulated loop of bowel was exposed and replaced. The wound was prepared and the various tissue layers were sutured separately. The mule was allowed the freedom of a small blue grass pasture, and beyond some suppuration, which later necessitated drainage, a complete and uneventful recovery resulted.

Laceration without Eventration. Laceration of some part of the abdominal wall without eventration is of very common occurrence and is caused in numerous ways. Because of the fact that fibers of the several muscular layers of the abdominal wall are disposed in various directions, large wounds occur without complete perforation. This is particularly true when the offending implement is not possessed of a keen edge or a sharp point. Horses are kicked by others that are wearing sharp calked shoes, receiving extensive lacerations, but it is very unusual for the victims of this mode of injury to suffer eventration at the time of accident. In jumping over and upon fences, lacerations of the abdominal wall occur; but unless the animal strikes an upright body capable of penetrating the abdomen, extensive lacerations usually take place without immediate eventration.

Lacerations of the abdominal wall are characterized by visible solution of continuity, fragmentary protrusion of margins, and more or less hemorrhage. Because of the facility with which separation of tissue layers takes place, sacculations are to be found under the margins of the wound; these extend in various directions, and where gravitation or pressure does not interfere, they are filled with blood.

Where such wounds are not too deep, and conditions make impracticable other and more elaborate treatment, they may be cared for by trimming away all macerated tissue, controlling hemorrhage, and further dressing them as open wounds.

Where such lacerations are deep and involve enough tissue that eventration threatens, coaptation of the wound margins in some manner is necessary.

In the handling of such cases in large animals, the first problem which confronts the operator is that of restraint. Certain it is that the subject must be confined, and unless the wound is high up on the side, a recumbent position is necessary. As a precautionary measure it is well to apply a temporary bandage to protect and support the parts until the animal is placed in readiness. If much suturing is to be done, complete anesthesia is imperative. Local anesthesia would suffice were it not that the subject usually resists confinement rather than the pain inflicted by the process of suturing.

Since the treatment of such wounds constitutes emergency surgery, there is no time for the preparation of the subject, and one must count on an occasional loss from anesthesia, delirium, or shock.

Careful attention must be given to cleansing the skin bordering the wound: a liberal area should be shaved, all macerated tissue removed and the wound thoroughly cleansed by mopping with gauze or cotton moistened with a very mild antiseptic solution or with sterile water. After hemorrhage has been controlled, all parts should be moistened with tincture of iodine. Particularly is this essential if the wound has taken place several hours prior to its being treated or if it has contained much dirt or filth.

Approximation of the wound margins, with the exception of the skin, may be done by means of continuous sutures of chromic gut. The several layers of tissue comprising the abdominal wall should be sutured separately. The skin should be sutured with a heavy material either of silk or linen. Mattress sutures serve very well. Reinforcing sutures in the skin and subcutem are useful in some cases. This method of suturing is applicable in all cases where coaptation is attempted. Some suppuration occurs in the majority of cases and drainage should be provided for by means of a tube or by inserting at some pendent part of the wound a suture that is readily removed. After-care consists in keeping the parts clean, restricting exercise, and plenty of time should be allowed that complete repair may take place, else hernia is likely to occur even three or four months after the wound has completely healed. The parts may be supported by means of a heavy bandage material during the process of treatment, but it is doubtful if this is of real service if the wound has been properly sutured. In the large animals, wounds so treated are completely united within thirty days unless swelling persists and considerable necrosis results.

A lacerated wound of the abdominal wall in a mule, the result of a kick with a sharp calked shoe, was treated at the Kansas City Veterinary College in January, 1911.

The injury was located in the right lower abdominal region, about eight inches from the median line and twelve inches anterior to the pubic brim. All of the structures except the peritoneum were lacerated. The wound extended almost at a right angle from the spinal axis, and was about five inches in length. Much dirt and filth had been carried into the depths of the wound, and there was extensive maceration of tissue.

The animal was placed upon an operating table and the wound was treated as herein outlined. Union of parts had taken place in about three weeks, and the patient was then dismissed from the hospital. She was put to heavy work at a grading camp and a hernia resulted. However this did not interfere with her usefulness, but was the direct result of an insufficient length of time for complete repair to have taken place before putting the animal in service.

WOUNDS WITH EVENTRATION AND WITHOUT VISCERAL PERFORATION. Wounds with eventration and without visceral perforation occur in all animals, the result of direct injuries of various kinds. The agent inflicting such injuries is not sharp enough to perforate viscera immediately upon contracting them, even though driven with great force. This type of wound occurs in horses where they are gored by bovines, where they become impaled upon upright posts or implements of various kinds. The writer has observed fatal eventration in the horse where a rent at least eight inches in length was inflicted by a Jersey cow's horn. Where much of the intestine protrudes it is likely to become injured beyond repair, unless it is given immediate protection in some manner until reposition is effected. Even though successful reposition of the intestine is effected there is danger of peritonitis, and considerable shock always attends injuries of this kind. Where such wounds involve the floor of the abdomen there is likelihood of hernia resulting unless it is possible to securely approximate the wound margins.

Treatment consists in, first, protection of the exposed viscera and appropriate confinement of the subject. After thoroughly cleansing the visceral organs reposition is attempted. In the large animals, if there is much struggling or straining, complete narcosis is needed. Reinforcement and protection of the wound with dressings and bandages is helpful in small animals and may be of some advantage in the large animals. However, where such wounds are kept covered, they remain moist and are prone to suppurate unless frequently redressed.

PENETRANT WOUNDS WITH VISCERAL PERFORATIONS. Visceral perforation occurs occasionally in any of the domestic animals and is the result of gunshot wounds, thrusts with sharp implements of any sort, or where animals become impaled upon sharp, projecting bodies. In the smaller animals tooth wounds sometimes penetrate the intestine.

Where the perforation is large, in animals that resist well manipulation of the peritoneum, it is possible to close the intestinal wound by means of bowel anastomosis or by approximation of its margins with sutures. Spontaneous marginal adhesion of serous membranes with the production of fecal fistula is not of uncommon occurrence.

Where small puncture wounds involve the bowel in numerous places, allowing the escape of intestinal contents into the peritoneal cavity, there is no effectual means of intervention except such as occasion laparotomy; therefore, the repair of this form of injury is often impracticable.

Dr. Adams: Well, gentlemen, that closes the program for this afternoon. I think that we probably have had enough for one afternoon. We have got a little tired listening, although the papers have been very interesting and the discussions on them have been profitable. Of course, in thinking of these last papers, the thing that is uppermost in our minds is the question, Are we doing all that we can do in abdominal surgery? We are apt to compare ourselves with the human surgeon. It has been very well shown, and I think it requires no discussion to demonstrate it, that the conditions under which we operate are often so unfavorable and we meet with so many obstacles that we can scarcely hope to do more than we are doing. For instance, in abdominal experimentation on the horse, various methods have been devised for the purpose of trying to keep him on his back until abdominal wounds experimentally produced have healed. It has always been found that the horse cannot exist long in that position. Not only does he suffer very shortly from pressure necrosis, but even before that he suffers very seriously, for instance, in intestinal circulation. When you turn the colon up on top of the mesenteric arteries, and do various other things, he almost immediately begins to have pain. Then you have to anesthetize your horse to keep him from struggling. So you have these insuperable problems. You can sterilize the anatomy of a horse; you can pare his feet; you can sterilize him, and you can put him in a cleanly kept room, but you cannot control him on his back; that is the problem right here: you cannot control him on his back. Then the organs that you are dealing with have such weight that the suture material will not hold. So there are some insuperable difficulties.

It is always amusing to me to have a human surgeon argue on these questions. I have had a good many arguments, and let me put it right down here, that almost every time, yes, every time that I can remember, where I have gone contrary to my own judgment, following the suggestions of a human surgeon, I have got into trouble, made a mess of of it. There is nobody, it seems to me, who is really more ignorant of the actual conditions that we deal with than the human surgeon.

I just recently had an experience with a man, whose name I do not like to mention, but he is one of the big surgeons of this country, having received degrees from abroad. One day he said, "John Adams, my horse has got an abscess on the right side of his neck." He had an abscess on the left side in front of the scapula. He said, "He is swollen on the opposite side and he has got pus there." "Well," I said, "I can't distinguish it at all; I don't think he is swollen; the only fluctuation he has is muscle fluctuation, in my opinion." But the surgeon is a man fifteen years older than I am. He said, "Another distinguished physician and I examined that horse carefully in the pasture last Sunday, and there's certainly liquid fluctuation there." "Well," I said, "Doctor, if you say so it must be so, but I wouldn't think so myself." "Well," he said, "I would like you to open it; will you do it?" I said, "I certainly will do it." And I went through the right side, examining it very closely, and I went on through his neck, but there was no pus that I could find on the right side. He was simply mistaken; that's all there was about it.

Now, last summer I spent a little time in the Mayo's hospital, and saw uncovered there the mistakes of the men that talk about us, because in a big hospital like that, where a great number of patients undergo operations, the results of previous ones are laid bare. For instance, I noticed one day a man sixty years old that came from a physician who thinks he is some physician. This man had been operated on eighteen months before that for some trouble; I think malignant trouble with his pylorus. Whether he had cancer of the pylorus I don't remember, but this surgeon attempted a gastro-enterostomy. He supposed he had taken the duodenum and wound it around so that the contents of the stomach would pass directly into the intestine, about twelve inches away from the pylorus, and would then go on down through the small intestine into the colon. But the man began to have trouble right away after this operation, and began to lose flesh. When we saw him he was not skin and bones, but he had lost forty or fifty pounds, and he was weak. Well, when Dr. Wm. Mayo opened him he was surprised, because when he pulled the stomach up the transverse colon came with it and apparently the transverse colon was stuck fast to the base of the stomach near the pylorus; and he went all around it to see whether it was simply an adhesion. No, there was no adhesion at all. Then he went down and found the duodenum and the ileum all right. Then he knew that this man had done a gastrocolostomy; he had short-circuited the fellow. He had a little stomach digestion, which does not amount to much you know, and then all this food which should have gone into the small intestine was going into the sink, that is into the colon, and right out. No wonder he was losing flesh. Now, there is one of the mistakes of a man who pretends to be some surgeon. I happen to know who he is.

Then, during the next two or three days, I saw three men who had been operated upon inside of twelve months for appendicitis, every one of whom had a gall-bladder full of stones. That doesn't prove that they didn't have appendicitis, but it does prove that the surgeon didn't examine the gall-bladder.

That will close the session for today. We will continue tomorrow at two o'clock.

Tuesday Afternoon, September 2, 1913

SYMPOSIUM

SECTION ON MEDICINE PARTICIPATING.

Dr. L. A. Merillat in the Chair

Dr. Merillat: Gentlemen, the section on Surgery will come to order.

The subject of "Lameness" will be introduced by remarks from Dr. Hughes.

DIAGNOSIS OF LAMENESS

By Joseph Hughes
Chicago, Ill.

Mr. Chairman and Gentlemen:

Having no paper to present, it may look presumptuous on my part to come before you with empty hands. The subject assigned me, however, "Diagnosis of Lameness," is so inclusive that it is difficult to determine where to start or where to stop; so I am taking a chance in the brief space of twenty minutes allotted me to give you some thoughts on this subject as they may occur to me. I did make an effort during the summer to come prepared and have had moving pictures taken of lame horses; but when it came to have these pictures put together, the assemblage of forms of lameness that resulted did not justify me in presenting them before this meeting. At some future meeting it will be a pleasure to me to get an opportunity of presenting to you an interesting demonstration of this subject.

Now the question presents itself, Where should one start in discussing such a subject? Diagnosis of lameness ordinarily brings us in contact with a horse that is lame. Such being the case, should we see the horse in the stable before he is led from his stall, or shall we permit him to be brought a distance to us before examining him? This to a great extent depends on the severity and sometimes on the obscurity of the lameness; but it is preferable, as a rule, to observe the initial movements of the animal. There are many lamenesses and imperfections of gait of a serious character, such as incipient spavin, incipient navicular disease, incipient or chronic founder and chorea which disappear after a movement or two or with a little exercise and that might have been readily detected and diagnosed if we had seen the horse at the moment he was being led from his stall. This is particularly the case if the horse is nervous or easily agitated.

The next step is to have the horse led into a good light, and to stand him on a perfectly level floor. It is at this stage, in my opinion, that the diagnostician of lameness gains most valuable information. A lame horse should be brought to a standstill as soon as he reaches a place where he may be thoroughly inspected, and, with his head unrestrained, his behavior should be watched for a prolonged period. While observing the animal the history of the case may be obtained from the attendant.

At times, in watching the horse at this stage and before he has been trotted, there are indications presented that are of a most significant nature. For instance, we may find that a horse keeps shifting from foot to foot in front; he seems as if he were looking for a soft spot to stand on. This may indicate that his shoes are pinching, or that his toes are too long, or that his feet are not level, or that he has navicular bursitis, corns, etc. It indicates trouble of some sort in the feet. At times we find the animal inclined to bring the column of bones of the front limb, below the elbow, into a vertical line; the apparent object being to relieve ligamentous or tendinous tension.

I shall endeavor to make a few illustrations on this blackboard. If my drawings are crude, you will pardon the effort, for even crude illustrations are sometimes helpful in serving to show positions which an animal takes in certain lamenesses.

A horse that has a slight lesion of a back tendon, or a tendon sheath or bursa, say incipient navicular bursitis, may merely show an upright condition of the pastern; he is endeavoring to shorten the distance between the point of origin and insertion of the perforans tendon, and thus relieve the tension by short-circuiting the region. Sometimes pronounced volar flexion of the fetlock is exhibited in this condition, and with it pointing of the foot. Variations of the three conditions mentioned may all be exhibited within a few minutes, as a horse stands before us. In studying the question of pointing, insofar as it relates to conditions of or diseases of the foot, it should be remembered that a horse generally points toward the situation which occasions him greatest pain or uneasiness. In case of toe-clip injury or of toe-crack, a horse points directly forward. In lesions of the outside or inside toe, say a puncture or crowding nail, he will point forward and outward, or forward and inward, as the case may be. If the trouble is in the outer quarter he will point in that direction, and if in the inner he will point to and attempt to cross the median plane of the body. If the injury is well back in the foot, say puncture in the fatty frog, he will point back and may elevate the heel from the ground. These same remarks are applicable to unlevel conditions of the foot, due to uneven paring, irrespective of the presence of actual disease, the horse always pointing to the situation showing excess of horn. In studying pointing, however, it is well to remember that lesions of other situations than the foot may be responsible for it, but at this stage of the examination one is ordinarily satisfied to locate it in the foot until local anesthesia or other methods of examination subsequently prove that the contrary is the case. Where the history indicates that the lameness resulted from direct violence, such as contusions or severe falls, great pain may be manifested at this stage of the examination, evidenced by the horse swaying back and forth or holding a limb elevated from the ground, or, if the injury is in the region of the loins, by his showing volar flexion of the hind fetlock joints. The inspection just outlined is an imperfect one and must be completed later.

We now see the animal trotted at the halter, in order to determine the limb or limbs in which he is lame, as well as to briefly note any peculiar or characteristic defect in his motion, and having satisfied ourselves on these points we again bring him to a standstill, and proceed with a thorough and systematic inspection. This inspection should not be confined to the lame limb, but should embrace the anatomical outlines of the animal at every part. It takes but a few minutes, and if done systematically by an individual who had a correct conception of the anatomy of the regions over which his eye passes, and whose visual keenness is such that it can appreciate or determine symmetry or asymmetry in regions, he rarely overlooks anything.

If inspection is incomplete, we at times overlook conditions that would give us a valuable if not direct clue to the nature of the lameness. Ordinarily, the conditions most liable to be overlooked are situated high up on the animal's body, that is in or above the elbow or stifle, in parts that may escape palpation or in parts where palpation does not readily reveal anything. For instance, while inspecting a lame horse from the anterior position, a bulging of the facial region attracts our attention and suggests that the lameness is in all probability due to osteoporosis; or when in the same position the eye detects an enlargement of the right or left trochanteric bursa of the humerus, or a tumefaction of the elbow-joint or radial regions the lameness might be sought for in one of these situations. Similarly, while inspecting from the lateral position, careful observation detects bicipital bursitis, gonitis, or possibly lumbar arthritis, and, while inspecting from the posterior position, that most common cause of high lameness observed in cities, recent fracture of the external angle of the ilium. This defect is best seen while inspecting from the posterior position, as is also the asymmetry produced by injury to and consequent enlargement of the bursa, giving rise to femoral trochanteric bursitis. Muscular atrophic condition of the pelvic region resulting from chronic lameness, possibly located at some distant point, as spavin, are best seen from this position.

In seeking for abnormal conditions and lameness situated below the body line, and usually referred to as low lameness, the same thorough inspection should be conducted, although in these regions inspection is distinctly secondary to palpation, because of the facility with which those parts can be digitally examined.

Having studied the animal in a position of repose, seen him in motion and determined the limb or limbs in which he shows lameness, and made a thorough inspection of his exterior, we, as a rule, have an opinion as to the location of the lameness, but this opinion must be verified by other methods of examination. This brings us to palpating the suspected region. In the short time at my disposal it is impossible to describe methods that might be applicable in the manual examination of every region affected with lameness, so that we will briefly consider palpation as we think it might be practised in certain cases.

In applying this method of determining the existence of lameness in a part, an accurate knowledge of anatomy is all essential; without such knowledge correct diagnosis is well-nigh impossible. An acute sense of touch properly exercised and combined with discerning judgment are other essentials. In palpating, the detection of abnormal heat in a part combined with increase in bulk of its textural structure, and particularly if on compression decided pain is evinced and lameness is shown while in motion, the diagnosis here is ordinarily simple.

We do not, as a rule, find all these symptoms present, and when present they are exhibited in varying degree. A horse lame with articular spavin or articular ringbone or articular splint, and which on palpation fails to reveal anything abnormal in the way of periarticular development, shows an absence of heat, pain and swelling, while *lameness* is the predominating symptom.

Conversely, a horse may present periarticular spavin, ringbone or splint, and yet exhibit neither lameness, heat or pain in the parts; the *local enlargement* being the conspicuous and only evidence. This complication of symptoms and of conditions at times renders differential diagnosis difficult, and it is only by giving to each condition due consideration that a correct conclusion can be arrived at. This conclusion is to be drawn from all sources having a direct or even remote bearing on the condition or lameness exhibited. The history, duration, posture, gait and physical evidences, as well as response to particular tests, instrumental, manipulatory, and analgesic must all be weighed and a diagnosis arrived at by a careful process of exclusion. Even then we are frequently mistaken, for the lame horse that shows a pronounced spavin, readily detectable by palpation and inspection, may and often has the true seat of his lameness concealed in a tardy incipient articular ringbone affecting the same limb.

Again, a horse showing a typical splint lameness and a readily palpable splint, between the large and small metacarpal bones on the *inside* of the limb, is most often lame from an impalpable and invisible splint developing between the large and small metacarpal bones on the *outside* of the limb.

Palpation in many lamenesses is best carried on with the horse resting squarely on all his feet. A slight uprightness of the pastern or volar flexion of the fetlock will, while the region is being palpated, give the impression that a pronounced ringbone is present. This can be readily disproved by compelling the horse to place normal weight on all his limbs and repeating the palpation.

Again, in lamenesses located in such structures as the check or suspensory ligaments, the parts are best manipulated with the limb retracted and elevated from the ground and a moderate compression with the thumb and forefinger applied along their course. In such cases the combined amount of thickness and tenderness which the structures show indicates as to whether they are responsible for the lameness present.

In palpation, delicacy of touch may be advantageously substituted for rough handling. The diagnostician who hammers the frog, pommels the shoulder, violently twists an articulaton or seizes the front limb and jerks it up and down after the manner of an oldtime pump-handle, may, instead of gaining information, only mislead himself. Resentment or fear on the part of the horse under such circumstances will in almost every instance lead the examiner to a false diagnosis.

Having completed palpation, if the seat of the lameness is not very obvious, we again see the animal in motion. As a material aid in diagnosis, an intelligent study of gait is of the utmost moment in all obscure cases. If the lameness is very severe, merely walking the horse is all that is necessary. Cases of paralysis of motor nerves, nail punctures, grave articular lesions, tenosynovitis, fractures and many other conditions, more especially those occasioning marked pain, are usually best determined at the walk. As the horse moves, the examiner, occupying the lateral position on the lame side, decides as to whether the impediment in motion is exemplified most during the period when the limb is being raised from the ground and advanced or retracted, or during the time when the foot comes in contact with the ground and weight is being borne by it. The former is what is known as swinging leg lameness, and the latter is supporting leg laneness, Ordinarily the question is readily solved where the lameness is very pronounced; still there are many instances, such as in traumatic infections of the foot and also in fractures, where casual observation causes one to reach a faulty decision on this point. A horse suffering from puncture of the outside shoe nail nearest the heel often presents a combination of swinging and supporting leg lameness that makes immediate differentiation difficult. So also in ulcerative diseases of hinge joints, the fetlock, the pastern, or the pedal joints, there is frequently observed a circumductory movement, particularly if the ulceration is confined to the outer division of the articulation, that causes the diagnostician to hesitate in expressing an opinion.

The lameness associated with picked up nails gives us, as a rule, the best illustration of typical supporting leg lameness. Paralysis of motor nerves, extending down the limbs, gives rise to variable symptoms which alter the gait.

In paralysis of a crural nerve, which we so often find accompanying or following azoturia, the lameness exhibited is of a supporting variety; the stifle joint collapsing for the reason that the crural muscles cannot sustain the patella. On the other hand, when the radial nerve is paralyzed, typical swinging leg lameness is in evidence; there being inability to elevate and advance the limb.

If the impediment in gait is mild in character or of a chronic nature it is best exhibited at the trot or in backing or in turning. Splint lameness, which is not manifested at the walk, is seen to great advantage at the trot, the weight of the forepart of the body being shifted from the lame and dropped on the sound limb at the moment it comes in contact with the ground. This checks excessive downward mobility, more especially of the small metacarpal bone affected and thus relieves pain. A lame horse which at time of inspection is observed to stand base wide or base narrow or to point in some particular direction, and whose feet appear distorted, showing perhaps unilateral contraction of the inner heel of one foot and of the outer heel of the other, will travel with a sprawling gait, and he will continue lame until his feet are balanced. Again, while turning, we find some horses show marked lameness. Ordinarily in such cases the trouble is in a hinge joint, where the slightest pivotal motion produces over-extension of the lateral ligaments and acute pain.

In traumatisms of the foot the same remarks are applicable; while turning, a slight pivoting of the inflamed sensitive core within the horny encasement producing great agony.

While backing, impediment in motion is often observed. A severe uncomplicated attack of laminitis confined to the hind feet, will cause a horse to rear up and almost topple over before he consents to move his hind feet from the floor. In pelvic fractures, particularly those involving the ischial portion of the pelvic floor, great difficulty is experienced in getting a horse to back out of his stall.

In the region of the loins, there are grouped many lesions that are responsible for peculiarities of movement, both in backing and turning, and which prevent a horse from readily rising from the recumbent position. Chief among these are sacrolumbar and lumbar arthritis. Articular spinal affections are not by any means confined to old horses and visible exterior distortion is not always present.

At the present moment there are twenty-four articulated horses' skeletons standing in the dissecting room of the Chicago Veterinary College, nine of which show extensive osteophytic deposits and ankylosis of old standing, involving the bodies, transverse and oblique processes of the lumbar vertebræ. These skeletons were taken from among the horses used for dissecting purposes last session and were selected in a haphazard fashion.

Lastly, as an aid in diagnosis of lameness, the production of local anesthesia has much to commend it. Its chief merit lies in the fact that it enables us to exclude regions, where with the diagnostician it is debatable as to whether a given lameness is above or below a certain point. In this respect it is a most valuable adjunctive measure; as at present used, however, it does not indicate the precise structure affected so that if accurate diagnosis is aimed at it leaves it incomplete.

Dr. Merillat: The discussions on these papers or addresses will be postponed until all of them have been presented.

Dr. McDonough will present the subject of "Hock Lameness," and then Dr. Adams will engage your attention prior to the consideration of the principal treatment of lameness, by Dr. McKillip.

Dr. McDonough: Gentlemen, I seem to be in good company here today. I am drifting at the present time between two conditions, one of joy and the other of fear and sorrow. I am pleased to meet all of you here today and join you and be privileged to say a few words to you before you all get out. That of course is a joy to me. But when I stop to think what a terrible thing it would be to this Association, and to everyone of you here, if something should happen to me, I am filled with sorrow—but I do not anticipate anything happening unless it happens here this afternoon.

Your committee has given me the subject of "Hock-joint Lameness." They probably gave me that subject for the reason that the cause of my lameness exists in that region. I have been lame in the hock for thirty years. So with your kind permission I will read a little paper that I have here, and I am awfully glad to know that there is no chance for a discussion until I have had time to get out of the room.

HOCK-JOINT LAMENESS

By James McDonough
Montclair, N. J.

Introduction. There probably is no condition that we are called upon to diagnose or treat with which we are more familiar than hock-joint lameness. And what your committee expects me to say that will be instructive or even interesting is beyond my power of comprehension. However, out of respect to them, I shall try your patience by mentioning a few things about hock-joint lameness and its cause that may prove sufficiently amusing to serve as an excuse for the few, if any, who may remain in the room.

Percentage of Lameness in the Hock. Barring accidents, probably the cause of 75 per cent. of all lameness of the hind limbs exist in the hock-joint, as shown by the report of a committee appointed by the New Jersey Veterinary Medical Association to examine the limbs of a number of horses. They report that of 106 horses examined, 103 showed lesions on the inside of the hock-joint of one or both limbs, that were likely to cause lameness. And our experience in practice bears them out in their statement, for while we have reasons of our own for not applying treatment to the hock-joint in so great a percentage of the lame animals we treat, yet I think a careful and impartial analysis of the results will prove this committee's report to be correct.

Cause. As injuries to the hock-joint so frequently occur, it becomes evident that either the conformation of the joint is deficient or its work has been abnormally increased.

Not having attained that degree of efficiency which will permit of our criticising the work of Nature, and in view of the fact that we have disturbed, and continue to disturb the adjustment of the entire limb to that extent, that it is impossible for the hock-joint to perform its work without injury, we must shamefully accept the responsibility.

That the hock-joint may perform its work with comfort it is absolutely essential that the limb be kept in its normal position.

Every care should be exercised to prevent its displacement in a direction not included in the motion natural to the joint. The hock-joint will not permit of motion to either side, and the broad quarters of the hoof are intended to prevent its displacement in that direction, and will prevent it if they are allowed to rest upon the ground; but when we apply a shoe that offers not the slightest support to the foot on either side, how can we expect the limb to perform work and escape injury?

Any form of shoe we apply robs the limb of a portion of its natural support. A pad seven-eighths of an inch thick deprives it of approximately 15 per cent. of the support furnished by the unshod hoof—by increasing the length of the hoof and not the width.

The blue shown on the paper corresponds to the size of the bottom of this foot resting upon the ground. When we apply a shoe or a pad seven-eighths of an inch thick, we raise the foot from the ground seven-eighths of an inch, and in that way lengthen the arm of the lever extending from the ankle to the bottom of the foot, which we will come to later, but we have not increased the width of the bearing surface. If that seven-eighths of an inch had been added to the length of the foot as a result of its growth, the oblique direction of the wall at the quarter would have carried the foot out to the size of the red shown around the margin of the foot (indicating with models).

If this increase in length were caused by its growth, the oblique direction of the wall would increase the width proportionately, and the relation between power and resistance would remain undisturbed. When a three-calked shoe, the ordinary heel-and-toe shoe, is used, the support at the sides corresponds to the length of the toe in front and the distance between the outside of the heels behind—approximately 55 per cent. of its natural support. There is no one who will claim that the web of the shoe can offer support to that part of the foot outside of its point of contact with the ground. Then why wonder at the results? The joint could not continue to perform its work under such conditions without injury if it were made of tempered steel.

Your time here is too limited to allow a further consideration of this subject at this time, but I ask that you take it up in your practice, as I know it will result in your discontinuing and discouraging the use of any form of shoe that does not provide the sides of the limb with support equal to the width of the quarters resting upon the shoe, and that will be from 10 to 15 per cent. less than nature considered necessary for its comfort.

The crippled conditions of our horses of today compel us to admit that their limbs are unequal to the task of performing their work under present conditions that tax them beyond their power of endurance. We, as veterinarians, are in duty bound to make a thorough investigation of the cause and do everything within our power to correct it. If these injuries result from conditions over which we have control and can remove, we are not true to our profession if we allow them to continue. What act is it possible for the veterinarians of the United States to perform better than that of relieving the suffering that those dumb animals have been compelled to endure in silence? In what better way can we fulfil our obligations to the public than to add 100 per cent. to the value of their horses by doubling their period of usefulness?

DIAGNOSIS. When we see a lame horse and suspect a spavin as the cause, we invariably look at and feel the inside of the hock; but how that can assist us in making a diagnosis is hard to understand, as the presence of a large spavin or the absence of a small one does not furnish the slightest proof that the cause does or does not exist there, for many horses go sound with very large spavins, while many others go lame from the same cause long before the presence of a spavin can be detected by the sense of touch or sight. So I think it better that we depend upon the history of the case, together with the shape of the hoof and the position of the ankle.

The history will be of special importance in the presence of an increased growth of the heels, as a punctured wound of the foot in the region of the heels, sprained tendons, or any condition of the foot or limb that will cause the animal to throw his weight in the direction of the toe, will cause the heels to grow high. But any of these conditions are likely to cause lameness immediately, and their presence detected before a change will take place in the growth of the heels. Spavin is the most likely condition that I know of to bring about such a change in the shape of the hoof and not cause lameness.

We must not lose sight of the fact that a horse showing all of the symptoms of hock-joint lameness might pick up a nail or injure some part of the limb below the hock. So a careful examination of that part of the limb should always be made.

I think the ankle-joint is a more trustworthy symptom, for unless caused by a sudden strain, 99 per cent. of all cases of spavin lameness will be preceded by some degree of knuckling, and 100 per cent. will show knuckling when lameness is present. I know of no other condition that the horse is heir to that will cause knuckling of the hind limbs whose presence cannot be detected.

Knuckling of the ankle, in the absence of any perceptible condition that will cause it, is accepted by me as reasonable proof that the cause exists in the hock, and upon that symptom alone I have applied treatment to that part of the limb and often with very satisfactory results. It surely can be relied upon to the extent of excluding from our examination all of that part of the limb above the hock.

TREATMENT. I have nothing new to offer in the way of treatment. I always try to lessen the work of the part by placing the limb in its normal position and apply a shoe that will keep it there.

When I say lessen the work, I do not refer to the work of overcoming the resistance at the toe; I mean the abnormal work caused by the limb having been forced out of the line of its long axis in the direction of the side. I have never felt that I got good results from raising the heel and shortening the toe, but find that much relief is given the animal by correcting the abnormal position of the foot and providing it with sufficient support at the sides, and many cases of hock-joint lameness will make a good recovery without further treatment and remain sound while the limb is kept in that position, to again go lame when a three-calked shoe is applied.

I will now conclude by expressing my appreciation of the great honor your committee has conferred upon me by selecting me as one deserving of the privilege of addressing this meeting. And I apologize for my failure to provide something more deserving of your presence.

I thank you for your attention and I hope you will take some action at this meeting that will result in correcting this great and long-existing evil. Fifty years is long enough for us to witness the sufferings of these animals and not offer them any assistance. We have even encouraged a continuance of this practice and collected our fee for treating its unavoidable results. And I know of no act we can perform more appropriate to this occasion than to restore to the limbs of these animals the support so essential to their comfort in the performance of their work.

Dr. McDonough: Now, I have got a lot of stuff in my system that I have got to get out, and I might just as well get it out here, I suppose, as any place. There can be no question but that we recognize the importance of providing the limb with a base of sufficient size to insure its stability. It is impossible that the limb of any animal can carry his weight in the absence of a base of sufficient size to give it support. A remark made at the last meeting of the New Jersey State Veterinary Association caused me to think that we are deceived as to just how much support some forms of shoes provide. The remark was this—that inasmuch as the web of the shoe extends to the margin of the wall at either side, it is compelled to provide the limb with the same amount of support that it could receive from the unshod hoof. There is no question in my mind, that if that part of the web outside of the line of its point of contact with the ground was removed and reduced to a shoe of this form (exhibiting model), there is no one but who would know that the part of the hoof extending past the line of its point of contact with the ground could not offer the slightest support to the limb. It is for the purpose of trying to demonstrate to you that a shoe of such a form can provide as much support as it is possible for the other to offer, that I ask your indulgence for a few minutes, and if you think you can stand for it I will proceed.

In order that we may better understand this thing, let us make a cross-section of the hoof and shoe at the quarters, and we find we have a shoe with an arm on either side 1¼ inches long, with the edge of the wall at the quarters resting upon the end of the arms 1¼ inches outside of its point of contact of the shoe with the ground. The amount of weight the one side will support is equal to the amount that will rest upon the other side, no more and no less. If the weight is equally distributed upon the two sides, with the center of gravity passing through the center of the foot, that part of the shoe will support a weight equal to its own power of endurance; but if, for any cause, the slightest difference exists in the amount of weight resting upon either side, its power to support any weight will be destroyed. In fact, the condition is similar to two children playing teeter-toter; as long as the teeter is in balance, they will play in comfort, but when either one shifts you know what happens. Now what are the conditions that must be present in order that this condition may exist? First of all, the two sides at the quarters must be an equal distance from the center of the frog; the toe of the shoe must be situated directly under the center of gravity; the two heels must be situated at a point an equal distance from the median lacuna of the frog; the relation of the animal's weight to the center of gravity must not be disturbed, for the absence of any one of those conditions will destroy its power to support weight, and as not one of them is ever present, that part of the shoe outside of the toe and heel cannot provide the slightest support to the sides of the animal's leg. If that be true, then just as soon as we apply a three-calked shoe to a foot of this size, we reduce the surface of support from 5 to 2¾ inches, and are still going; we have not got through reducing it, for if one side of the hoof is contracted (and one side of nearly all horses' feet is contracted more or less), the center of gravity will move farther in the direction of the low side. Here we have a contracted hoof (exhibiting model); there is not a man in the room who would not pass it in for a sound foot; but we find that the distance from the center of this limb to the edge of the wall upon the one side is about three-eighths of an inch more than it is on the other side, for the reason that the contracted side is always driven up and becomes the high side. When this foot rests upon a shoe, the limb will drop in the direction of the low side. Let us attach a pendulum to this foot; it will take but a minute. Of course I cannot hold this foot level. If it were possible for me to hold this shoe in a perfectly level position (I am compelled to hold it up so that you can see it) and this foot is rested upon it, the pendulum will move in the direction of the low side. When placed upon a perfectly level surface, using this model (indicating), it drops over until the center of gravity reaches a position of 1⅛ inches from the outside of this shoe, which is the line of support. You cannot under any conditions get outside of this line of support (indicating). We have now reduced the supporting surface of this hoof to 2¼ inches; and we are not through yet.

Supposing the foot rested upon a shoe of this kind, worn upon the one side (and most horses wear their shoes more upon the one side), the foot then would be tilted over farther in the direction of the low side as a result of the calks having been worn more upon the one side than the other; and if it is on this particular shoe, the center of gravity will then move to a position of five-eighths on either side, corresponding to a hoof 1¼ inches in width.

Now, as ridiculous as that statement may seem, as impossible as it may appear that such a condition can exist, the cold fact remains that the supporting surface of this hoof, that was 5 inches across, has now been reduced to 1¼ inches. The entire weight thrown upon that limb is resting upon 1¼ inches of the width of the surface of the hoof. The animal now stands with the ankle thrown out in the direction of the low side, a condition that can easily be detected with the naked eye, and results in the formation of another lever with the arm extending from the ankle-joint to the point of contact below, which is the arm of the lever we created at either side of the shoe. If the horse's weight, or any part of it, could now be thrown upon the outside of the bone at the ankle-joint, the power generated at the point of resistance would be sufficient to crush to dust the largest and strongest bone in the horse's body; but, fortunately for the animal, the weight has been relieved, the weight cannot rest there longer because the relation of those bones to each other has been changed. The position occupied by the limb now is similar to this (indicating). The weight can no longer rest upon the outside; but if it has been taken from the outside, it has got to be placed upon the inside. Now we have shifted the weight from the outside, at the articulation of the ankle-joint, to the inside, and have shifted the weight below from the center of the foot to the outside, thereby causing the weight to pass through the limb from the outside toe to the inside of ankle-joint. But the metacarpal or metatarsal bones cannot follow the direction of the other bones for the conformation of their articulation above prevents it, and the weight that has now been thrown upon the inside of the bone at the ankle must continue along the inside to a region above the hock or knee-joint. If these statements be true, then, injuries to that part of the limb below the ankle should be found upon both sides, while injuries to that part of the limb above the ankle should exist upon the inside only, for the reason that the inside of the limb is performing all of the work.

I now wish to refer to a report made by a committee appointed by the New Jersey State Veterinary Association to examine a number of horses. They examined 106 horses, and reported as follows: Of the 84 injuries found upon the limb below the ankle, 69 were found upon the outside and 15 upon the inside; of the 330 injuries found upon the limb above the ankle, 328 were upon the inside and but 2 upon the outside. Does it seem possible that this could be a mere coincidence? Does it seem possible that this number of injuries could just happen to exist upon the part where the work had been increased through accident? It certainly does not; but we have gone up the limb, and have forgotten about the foot. Let us return to the foot just a few minutes and then I will be through.

We found that when the foot rested upon the shoe worn to the one side, the bearing surface was reduced to 1¼ inches, and the weight passed through the limb from the inside of the ankle-joint to the outside toe. Now, that direction must continue through the hoof back to the heel. You cannot change it; you cannot grab hold of it here and throw it back on this heel. It will continue in a straight line, with the following results: The part of the horse's foot supporting the weight of his body, and performing its work, is represented between these two papers (indicating with papers). That part of the hoof outside of these papers cannot assist in supporting the limb as it is outside of the line of gravity. It is supported by the outside toe and the inside heel. Is it any wonder, in view of the fact that the foot generally rotates to the outside, that we find bruises and corns upon the inside heel? It is utterly impossible for the foot, the toe included, to rotate in the direction of either side without increasing the work of the opposite heel.

This whole condition is so complicated and hard to understand by the average horse-shoer or horse-owner that I thought it might be wise to reduce it to a condition that would be more simple and more easily understood, and this is the result of my efforts. (Speaker exhibits chart.) Do not open the heels. Do not cut the sole or frog, nor remove enamel from outside of wall. Do not apply any form of shoes that will not furnish support to the sides of the limbs. Always fit shoes with the heels an equal distance from the center of frog.

But I find it necessary to make several corrections that it may conform with the ideas of some who are engaged in instructing students in this work. I have selected a couple of specimens of hoofs sent by a veterinary college for your inspection. I find that the sole and frog have been most carefully cut and pared, that the enamel has been carefully removed from the outside of the wall, and that the one heel occupies a position nearly three-fourths of an inch closer to the center of gravity than the other heel. I find the foot has been furnished with a shoe that we have just proved, or at least attempted to prove, robs the sides of the limb of most of its support, and they even have gone to the extreme of turning this wide heel in the other direction so as to deprive it of more support, and, while they have not succeeded in depriving it of its entire support, there is no one who can find any fault with the amount that remains.

To conclude, while we may find it hard to furnish an excuse for having allowed this condition to continue for so long a time, we will find it harder to furnish an excuse for allowing it to continue longer. I beg of you here today not to allow the final adjournment of this meeting before you have branded this diabolical practice with your stamp of disapproval; this practice that has caused more suffering to the animal and more loss to its owner than any and all other conditions that the horse is heir to or man can subject him to. Brand it so deeply and so firmly that the hand of time cannot deface or erase it, that when we are dead and gone it may forever stand out boldly as a fitting memorial of the good service performed by this Association upon the occasion of its fiftieth anniversary.

I thank you now for your time, I thank you for your close attention, and for your wonderful display of patience that I will tax no longer, so will conclude by extending to all of you the best wishes, the good-will and the hand of good fellowship of the Veterinary Medical Association of the state of New Jersey, which is entitled to any benefit that may come from the change from this diabolical method of shoeing with three-calked shoes, to the more modern and humane method that will restore to those dumb animals the conditions provided by Nature for their comfort.

I thank you, gentlemen, I thank you all; and I thank you, Mr. Chairman.

Dr. Merillat: We will now listen to Dr. John W. Adams, on the subject of "Lameness of the Foot."

METHODS OF CLINICAL DIAGNOSIS OF LAMENESS ORIGINATING BELOW THE FETLOCK

By John W. Adams
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A correct diagnosis is the foundation of rational therapy. To diagnose means to know through and through, and therefore presupposes an accurate knowledge of the structure (anatomy) and action (physiology) of the living machine whose defective action in lameness we seek to determine. The phrenologist who charts the bumps of the human cranium has about the same chance of estimating the mental peculiarities of his subject as has the burglar, who passes his hands over the panels and bolts of a safe, of determining whether or not there is a five dollar bill within. Neither individual has a more difficult task than he who with an indifferent acquaintance with the mechanics of the foot attempts to locate and identify impalpable defects that lie beneath the surface.

A complete routine examination should include the following: (1) history of the lameness; (2) inspection of the patient; (3) palpation of the foot; (4) passive movement of joints; (5) examination of plantar and digital arteries. To these may be added, on occasion, mensuration, percussion, anesthetic injection, microscopic examination of discharge, and radiography.

1. History. A fairly complete history is one-half the diagnosis. We should try to ascertain the duration and supposed causes of the lameness and the nature of the treatment, if any has been applied. Pertinent questions are: How long has the horse been in the present owner's possession? How long has the animal been lame? Did the lameness arise suddenly or gradually, at work or in pasture or in the stable? Is the lameness continuous or intermittent? Does it increase or diminish under exercise? What has been the effect of a day or more of rest? Other questions may elicit valuable information as to the influence on the lameness of soft ground, asphalt, cobble or Belgian pavement, travelling up or down grade, the trot or gallop, open shoes, bar-shoes, rubber pads.

In asking these questions we bear in mind that lameness arises gradually in such chronic processes as give rise to navicular bursitis, sidebone, keraphyllocele, the various compressions of the pododerm due to contractions of the hoof (one or both quarters, sole, contraction of wide hoofs), deforming arthritis of pedal and coronary joints (low and high ringbone). Sudden lameness may be due to fissures, fractures, sprains, contusions from blows, kicks, tread, pricking, close-nailing, street nail, cracks of wall or bar.

Lamenesses that are apt to improve with a few days of rest are those due to navicular disease (incipient), aseptic pododermatitis from contusion (corn), sprain, tendonitis, traumatic tendovaginitis, acute periostitis, deforming arthritis with incomplete anchylosis. Lameness arising within a few days following shoeing justly arouses suspicion of close-nail or pressure pododermatitis.

2. Inspection. Whenever possible observe the horse standing at rest and unconscious of such observation—preferably in his own stall. Gum shoe it to a point where you can see his legs and feet. Under these conditions we may note a looseness of leg (incomplete weight bearing), a knuckling at the fetlock, a bowing of the knee, a slight raising of the heels from the floor, or an advancing of the foot (pointing), that in an animal of nervous temperament may not be shown if the animal is conscious of being observed.

Next, back the horse from his stall with your eyes fixed on his legs. In soreness of the flexor apparatus, joints and pododerm about the toe, pain is caused by dorsal flexion of the toe when the affected leg, having been carried backward, is set toe first to the floor. This movement is therefore often incomplete, as in laminitis, navicular disease, tendonitis of the perforans, ringbone of the pedal joint, toe crack. The turn or twist upon the lame leg is painful, particularly when there is present an arthritis or periarthritis (sprain, ringbone), and it is in those joints which permit of greater rotation, as the pedal and coronary joints, that such rotation is most valuable as a diagnostic measure.

Lead the horse into good light, upon as nearly level a surface as is available, place him squarely on his feet, walk around him, look him over, take his age, and caress him a little to put him at ease. While doing this try to imagine what his life has been: What class of horse is he? What has been the nature of his work? When clear on these points have the horse walked in a straight line from and toward you; then trotted from and toward you, and finally walked and trotted past you, that the manner of raising, carrying and grounding the feet may be observed; that you may learn that the horse is actually lame or not, and if so in which leg, the degree and character of the lameness. While at a trot the carriage of the feet will clearly indicate the actual standing position, which is important to know and which is not always pronounced while an animal is at rest. The horse with a laminitis attempts to carry his weight on his plantar cushions and the feet are kept well in advance. Dorsal flexion is painful in inflammations of the flexor apparatus, and is therefore incomplete, and the last half of the phase of contact of hoof with ground is shortened when there are present such lesions as navicular bursitis, flexor tendonitis, acute synovitis of the sesamoid sheath, hyperplasia and contraction of the suspensory ligaments of the lateral cartilages synchronous with ossification of these cartilages.

With the horse in a natural standing position, view his legs, pasterns and hoofs critically, from in front, in profile and from behind, at a distance of eight or ten feet. We should note the direction and thickness of the pasterns and the slant of the hoof. Do these correspond in obliquity, or is the foot axis broken inward, outward, forward or backward? Are the walls straight or convex or concave? Do they present cracks, clefts, irregular or unusually prominent ring formation? Prominent rings upon one or both quarters are often associated with corns, previous treads of the coronet, intermittent bruising of the heels, and occasionally with sidebone. Thrush rings, built up of periople and crossing the rings formed on the coronary band at an acute angle, are the sequence of a mild chronic inflammation of the velvety tissue of the frog (thrush) which has spread to the perioplic band by continuity of structure. With base-wide and base-narrow feet are often associated sprains of the joints, contraction of one quarter, upward displacement of one heel, quarter crack, and pressure pododermatitis (corn).

The slant of the pasterns and toe (foot axis) viewed in profile is a determining factor in a number of lesions. In the upright pastern and hoof, common to the thoroughbred and altogether too frequent in American-bred Percherons and Belgians, too large a proportion of the weight is transmitted from the canon through the pasterns. Concussion is excessive and inflammation of bone is induced, which eventuates in sidebone and ringbone—twin progeny of concussion. Corns of the sole and contraction of the quarters are rare in the upright hoof because in it the sole is usually well arched, the frog broad at its base and the buttresses wide apart. I do not know that the slant of the pastern has any causative relation to navicular disease. Its more frequent occurrence in the narrow feet of "hot-blooded" horses is probably due rather to the more intense and oft-repeated stresses to which the perforans tendon is subjected at or near the point where it passes under its pulley (navicular bone), which in the thoroughbred is in length and width apparently deficient.

The acute-angled foot suffers frequently from corns, bruised heels, contraction of the quarters, quarter cracks and coronary toe crack.

Inspection should include the shoeing. Note any excessive length or deficiency of the wall. While overgrown hoofs are more often crooked, awry or otherwise misshapen than those of proper length, defects of form are more noticeable but less injurious in long than in short hoofs. Hoofs deficient in horn and of irregular form are more difficult for the average shoer to fit, and in them close nailing and shoe-pressure pododermatitis are common.

Note the height of the clinches, the fit and ground wear of the shoe. Uneven wear of the branches means unequal internal pressure of the lateral halves of the foot and suggests corn, contracted quarter, mild chronic sprains of the ligamentous structures about the joints, periostitis or exostoses at the points of insertion of the lateral ligaments of the coronary joint, and sidebone.

It is often advisable to remove the shoe, drawing each nail separately, to clear away the flakes of solar horn, open up the middle and lateral clefts of the frog, remove a thin layer of horn over the entire sole and frog, exposing the entire length of the white line. Gathered nails, hemorrhagic discoloration of solar horn, thrush, canker, loose wall, hollow wall, bar crack, keraphyllocele, flat hoof, contracted sole, dropped sole, are some of the causes of lameness that may be revealed.

At the coronet the most frequent abnormalities are contusions, bruised and punctured wounds from tread and overreach, necrotic dermatitis, subcoronary abscess, quittor, and at the toe ringbone of the pedal joint. Circumscribed, soft, painful swelling of the coronet may be subcoronary abscess, while a circular, less prominent and somewhat firmer swelling about an inch above the hair line and extending around the front and both sides of the short pastern indicates a serous or purulent arthritis of the pedal articulation. The entire coronet is slightly edematous in laminitis, and is much swollen and partly or completely detached from the walls just prior to exungulation. Sinking-in of the coronet about the toe occurs in subacute and chronic founder. A hard, ring-like projection of the coronet, and often of the wall just beneath the coronet at the toe, may indicate ringbone of the pedal joint (English "buttress foot"). Firm swelling of the region of the cartilage may indicate infection of that structure, while if that part of the cartilage which projects above the wall is incompressible and somewhat thickened it is probably ossified. Obliteration of the hollow between the heels is present in phlegmon of the plantar cushion.

3. Palpation. By feeling the surface with the hands we seek to detect abnormalities of temperature, sensitiveness to pressure, consistency, crepitation, mobility of joints and the character of the pulse in the plantar and digital arteries. Mediate palpation employs the pincers (hoof testers), the wedge and the probe.

The veterinarian cannot be too familiar with the surface impressions derived by allowing the hand to glide slowly downward under light but even pressure from the carpus or hock to the hoof. Repeat the act till every part of the surface has been felt and compared with the corresponding part of the opposite leg. In thin-skinned legs experience will enable us to detect protuberances too small to be caught with the eye. Note particularly the comparative girth of the coronary joints, the fulness and elasticity of the coronary band, the character of the suspensory ligament and flexor tendons, the roundness or angularity of the fetlock-joint in the sesamoid region, the consistency and tension of the upper and lower culs-de-sac of the sesamoid sheath, the presence or absence of osselets on the borders of the long pastern.

Temperature manifestations of skin and hoof are registered more accurately through the dorsal surface of the fingers than through the volar surface or palmar surface of the hand, especially if the epidermis be thickened by work. The horse should be cool, and we should not allow ourselves to be deceived by the warmth due to previous liniments or blisters or to the chafing caused by use of ankle or quarter boots.

The character of the pulse in the plantar or digital arteries should always be determined, for it is often of the greatest value in locating an inflammation below the fetlock. Acute inflammations in the pododerm, hemmed in as this structure is between the os pedis and the horn capsule, are accompanied by compression of the capillaries, a slowing of the blood current and a distention of the arteries leading to the foot. Under such a condition in a clean-legged horse the plantar artery can be felt standing out prominently by passing the tips of the fingers lightly across the inner face of foreleg at the middle of the canon, and in a hindleg on the lateral side below the hock and just in front of the head of the splint bone. The digitals are less prominent and in meaty legs are often imperceptible. In testing the pulsation of the plantar arteries, see to it that the horse is cool, *i. e.*, that his heart is not accelerated by prior exercise. Test the artery while the leg supports its share of the body weight. Instead of bending over to reach the part, sit on your own heels, keeping your body upright. Pass the tips of the fingers from behind the foreleg to its inner face and use the tip of the middle finger upon the artery. Don't compress it with force but touch it lightly till you feel the pulse wave, and compare it with that in the artery of the opposite leg. A full, tense, bounding pulse wave in a plantar or digital artery, if not due to exercise, is a reliable indication of such inflammations of the pododerm as laminitis, due to close nail, founder, cracks, treads of coronet, corns, bruised frog or heels, to compressions of the pododerm by the various contractions of the hoof, and to punctures of the sole or frog.

The pulsation is not strengthened by navicular disease and but little if any by arthritis of the pedal-joint or sidebone. It is always most pronounced in acute pododermatitis, but is also marked in fracture of the phalanges, in subcoronary abscess and in phlegmon of the plantar cushion.

The use of pincers to compress the tissues within the hoof is a form of palpation. Such pincers should be so rigid as not to bend in the handles under moderate compression. By them we are able to detect sore areas of the pododerm, but also in the plantar cushion, navicular region, os pedis, lateral cartilage and pedal-joint.

The compression, which should be sufficient merely to move the horn sole, should be first applied at a point on the margin of the sole that is supposed to be free from inflammation, and should be repeated at this point till the animal has grown accustomed to this unusual feeling, when the pincers are moved by short advances toward the suspected seat of inflammation. Percussion by such an object as a tack hammer is a rapid palpation that is probably a more accurate test for acute pododermatitis than the pincer pressure test.

Passive movements of the joints may produce pain when there are fissures, fractures, sprains, arthritis or periarthritis. Rotation is especially painful when there is an arthritis or a periarthritis of the coronary or pedal-joint. To test the coronary joint for a sprain, flex the leg, have an assistant grasp the long pastern tightly in his two hands, and then seizing the hoof, twist it slowly. The short pastern cannot be held so as to limit torsion to the pedal-joint.

It is often illuminating to note the effect of the body weight upon a hoof which is under dorsal, volar or lateral deviation. For this a wedge about 6 inches long, 6 inches wide and 1½ inches thick at the base is of great service. By compelling a horse to stand on such an inclined plane, which can be sloped in any desired direction, we can readily test the sensitiveness of the flexor tendons, suspensory ligament and lateral ligaments of the interphalangeal joints under a somewhat greater stress than we can obtain by manipulation with the hands alone. With the base of the wedge under the heels the foot-axis is broken forwards, the perforans is relaxed, the suspensory ligament under increased strain, the plantar cushion and frog under increased pressure, and the os pedis is thrust forward into the toe of the hoof. This position should give relief in tendonitis of the perforans and navicular disease, but be painful in sesamoiditis, inflammation of plantar cushion, keraphyllocele at the toe and in arthritis or periarthritis of interphalangeal joints. With base of the wedge under the toe the foot-axis will be broken backwards, the perforans tendon put on a stretch, the suspensory ligament relaxed, the plantar cushion relieved of some pressure, the posterior coronary ligaments and suspensory ligaments of the navicular bone and lateral cartilages tightened. The wedge test should first be applied to the sound foot, *i. e.*, each particular application of the wedge should be made first on the sound foot, then immediately on the lame one, in order by comparison to determine the true effect of this manipulation.

Mensuration is of little value. The practised eye will detect variations in volume and diameter of the hoofs to one-fourth of an inch. Calipers may be employed to get the transverse diameter of the hoof at the coronary border. Considerable differences in size and shape often exist in perfectly sound pairs of feet. The narrowing of a hoof as a result of a lameness is merely an evidence that during a variable time—several months—the hoof has borne less than its share of the body-weight, and is no proof that the lesion is any where near the foot.

Diagnostic Cocaine Injections.[1] When in doubt as to the seat of an obscure lameness, whether above in the region of the shoulder or hip, or below in the foot, or between the two, one may finally resort to subcutaneous cocaine or alypin injections along the course of the sensitive nerves. The object is the temporary abolition of lameness due to pain. Usually it is employed to determine whether the lameness is due to some chronic inflammation within the hoof that presents no certain objective evidence of its presence (incipient navicular disease, arthritis of pedal joint), or is higher up the leg.

The diagnosis is important because it may enable the veterinarian to institute proper treatment (neurectomy).

The first injection is usually made over the plantar nerves inside and outside of the leg, just above the fetlock. One-half to three-fourths of a dram (2–3 c.c.) of a 4 per cent. solution over each nerve is sufficient. Complete anesthesia of the nerves occurs in about fifteen minutes and lasts about thirty to sixty minutes. Should the lameness disappear fifteen or twenty minutes after this injection it is to be sought for below the point of injection. If the examination has failed to detect any lesion in the fetlock or coronary joints it is more than probable that the seat of the lameness in the foot. In similar manner by cocaine injections over other nerves, as the median, ulnar, peroneus, tibialis, plantars, volars and digitals, one may locate lamenesses in other parts of the limbs.

The appended scheme of Udriski[2] is followed by many diagnosticians in this country.

[1] "Chirurgische Diagnostik der Krankheiten des Pferdes," Prof. Dr. Eugen Fröhner, Zweite Auflage, 1907.

[2] Udriski, Monatshefte f. prakt. Thierheilkunde, 1910, xii Band, S. 409.

- *First* injection over the median nerve.
  - Lameness disappears: *second* injection (double) on each side of leg, above the fetlock.
    - Lameness disappears: third injection (double) below the fellock, over the digital nerves.
      - Lameness disappears: it is in the foot.
      - Lameness remains: it is in the region of the long pastern.
    - Lameness remains: the *third* (double) injection over the plantar nerves at the middle of cannon where, they anastomose.
      - Lameness disappears: it is in the region of the lower part of the cannon.
      - Lameness remains it is located between the upper third of the cannon and the upper third of the forearm.
      - To determine the location definitely, it is advisable, in such cases to make several injections along the ulnar nerve.
  - Lameness remains: its location is either
    1. In the shoulder, or
    2. In region supplied by the ulnar nerves.

During the past two years I have used alypin as a local anesthetic, and prefer it to cocaine in diagnosing the seat of lameness.

Fröhner[1] writes of it as follows: "Alypin has been recommended as a diagnostic anesthetic preferable to cocaine which provokes undesirable excitement in many horses of nervous temperament." According to Dittmer and Kärnbach (*Monatshefte für prakt. Thierheilk*, 1907), alypin with the same local action is ten times less poisonous than cocain, and in ordinary dosage never gives rise to unpleasant general symptoms. The anesthesia from alypin is complete in eight to ten minutes, twice as rapid as from cocain (fifteen to twenty minutes), and the local irritation of the tissues is less (a negligible hyperemia). Finally alypin is somewhat cheaper, its solution does not deteriorate with age, and may be sterilized without decomposing.

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[1] Chirurgische Diagnostik der Krankheiten des Pferdes, zweite Auflage, Seite, 83.

Dr. Merillat: Are there any discussions on these three papers or addresses? If so, I would like to hear them now, and with that the meeting will close. On account of the lateness of the hour the other papers on the program for this afternoon will be postponed until tomorrow, and also because there are two papers on tomorrow's program that will not be presented on account of the absence of the writers. We hope also to hear from Dr. Berns tomorrow on the subject of neurotomy. Are there any questions that you wish to ask?

Dr. Leech: Dr. Adams gave a very fine and distinctive description of incipient side-bone. I should like to ask him whether he would pass as sound a stallion used for breeding if there was evidence, be it ever so slight, of beginning ossification of the lateral cartilage?

Dr. Adams: Yes, I would. However, I should explain that statement. I would not say that a horse had a side-bone unless the cartilage was incompressible where I could feel it. I believe that side-bone is a result of concussion, which is often intensified by uprightness of the pasterns, and that there is in some horses a prediposition to osteitis. I take it for granted that from equal amounts of concussion Belgians and Percherons are more liable to osteitis than are thoroughbreds. In other words, I believe that bone differs in quality, and that certain classes of horses develop side-bones with greater regularity than other classes in which the concussion is equally great or perhaps greater. Even though a stallion had a short, upright pastern, more upright than normal and shorter than normal, and had a cartilage which was stiff—not actually inelastic and bone-hard, but not as compressible as I thought it ought to be, or as the corresponding cartilage of the other foot, while I should suspect that the animal was developing a side-bone, yet I would not withhold a license on that account. But I wish to ask a question: Does the Minnesota law require that stallions be examined annually?

Dr. Leech: No.

Dr. Adams: Are reëxaminations made at intervals?

Dr. Leech: Once in four years.

Dr. Adams: I think the interval is too long.

Dr. Leech: One more question: would a stiff cartilage in a base wide or a base narrow foot be regarded by you as more or less prejudicial than a stiff cartilage in a foot of the regular shape?

Dr. Adams: I would rather see it in a base wide foot than in a base narrow foot. If a horse stand base narrow, with a greater proportion of the weight resting on the outer half of the foot, an outer side-bone will be a greater detriment than it would be if the horse stood base wide. But the point I wish to make is, that a horse with a normal slant of foot, and a proper length of pastern, seems to me to be a better risk with a stiff cartilage, which is not entirely incompressible, than the horse that stands upright with short pasterns and equal stiffness of cartilage. I would expect the horse with upright pasterns to develop side-bones quicker.

Dr. Leech: How would you regard the base wide foot with the outer quarter drawn in? In a great many Percheron horses we find that condition, that the base wide foot is contracted in the outer quarter. Would that influence you in granting or withholding a certificate of soundness?

Dr. Adams: A horse that stands base wide ought not to have the outer quarter drawn in. He ought to have a full outer quarter and less convex inner quarter—just the opposite; and if I saw a draft horse base wide with a flattened outer quarter, I would regard that quarter as contracted and examine it carefully for side-bone, because contraction of the quarter always follows ossification of the lateral cartilage, though, of course, the reverse is not true.

Dr. Merillat: There is one question I would like to ask Dr. Adams: Is a negative result following the injection of an anesthetic interpreted by you as conclusive that the lameness is not below the seat of injection?

Dr. Adams: No. Thorough anesthetization of the digital nerves (posterior branch) does not always completely remove sensation from the navicular region, nor does it appreciably lessen the pain of a pedal arthritis or periarthritis. There are numerous other areas in the limbs that are not numbed by anesthetizing a single nerve trunk at some proximal point.

Dr. Merillat: Are there any more questions to be asked on these papers? If not a motion to adjourn is in order.

Motion to adjourn was carried.

Wednesday Afternoon, September 3, 1913

Dr. Williams in the Chair

Dr. Williams: Will the section please come to order?

The first paper to be presented is on the subject of "Firing," by Dr. George B. McKillip, to which we will now listen.

FIRING

By George B. McKillip
Chicago, Ill.

The term firing, in its present-day usage, refers to the application to the tissue of heated metal (the actual cautery) to produce a counter-irritation for the treatment of pathological conditions, chiefly lamenesses, in the locomotory organs. It is a strict veterinary term. Not infrequently it is incorrectly used synonymously with cauterization, a more general term, the meaning of which includes the charring of tissues for a wide variety of purposes, using either heated metals or caustic drugs to accomplish the results. Firing, therefore, is but one type of cauterization, accomplished by the application of a heated metallic instrument to the tissues to be treated and for the purpose of relieving pathological conditions in the locomotory organs. It is a specific rather than a generic term.

Firing produces in the tissue fired an acute inflammatory process the severity of which varies with the degree of cauterization. A study of the pathology of acute inflammations shows that the character of an inflammatory reaction, based upon the exudation, varies with the causative irritant. Thus, one type of an irritant will create a purulant exudate; another irritant, a fibrinous exudate; another a serous, and so on down the list. Cauterization (burning) is a type of irritant that produces a pure serous inflammatory process. The exudate in a burned area is abundant; it is a serum of relatively low specific gravity and great fluidity; it contains all the ferment constituents of the body fluids but has no fibrin or cellular content and is not coagulable under body conditions. It is because of these peculiarities that firing becomes so serviceable in the treatment of chronic inflammation causing lameness. How, we shall see later.

There is another feature about the acute inflammation of a burn that is of interest and importance in this connection. It is this, that in such a reaction there is a maximum of exudation with a minimum of tissue degeneration. The pathological process in an acute inflammation may be separated into three parts, viz., the hypermia, the exudation and the tissue degeneration. Every acute inflammation has these three factors, but in the different inflammations they vary in their relation to each other. They vary not only in character but also in amount and extent. Thus one irritant may cause an inflammation in which there is a considerable degeneration of tissue but with slight exudation and in another inflammation the reverse may be true. In firing, as stated before, there is a reaction in which there is an abundant serous exudate and a minimal amount of tissue injury, providing that the burn is of the correct degree and providing also that the actually burned tissue is not considered.

The vesicant drugs and chemicals are irritants producing reactions like that from firing, there being a voluminous serous exudate out of all proportion to the amount of tissue injury from the toxicity of the irritant. These materials have practically the same range of adaptability as firing, but are less effective in that the reaction caused by them cannot be made sufficiently severe and extensive without endangering the superficial structures to which they are applied.

With these facts before us we are in position to consider the question of how firing affects lameness. Lameness in which firing is adaptable as a treatment may be divided into three groups: First, a large group of lamenesses due to simple chronic inflammations of the essential or accessory organs of locomotion in which the inflammations are in the late acute or early chronic stages and in which the effect of the firing is to cause a removal of the inflammatory deposits and a cessation of the original inflammation; second, a smaller group, osseous and arthritic in character, in which there is an advanced simple chronic inflammation with deposits, and in which the effect of the firing is a continuation and exacerbation of the inflammation already present until the involved articular surfaces are obliterated; and third, a small group of muscle and nerve atrophies and degenerations in which improvement of local nutritional conditions by vascular stimulation in the area might be of importance in the regeneration of the organ at fault.

In the first group are included all simple inflammations of locomotory structures in which the inflammation has progressed beyond the acute stage and in which the ordinary treatments for acute inflammatory processes have failed to produce a resolution. In such cases there is deposited in the tissues inflammatory exudates which have become solid in character. These are chiefly fibrinous and their presence, by irritation, produces a physiological aberration which to the clinician is exhibited as a lameness. Acute inflammations that are not septic and that clear up promptly within ten days to two weeks, with or without treatment, leave no such deposits. The exudates in such a case are completely removed by liquefaction and solution in the body fluids. The course of the inflammation being short, there is no tissue hyperplasia and there is a perfect return to normal.

A delayed resolution (beyond the fourteenth day) of an acute inflammation means that these exudates are not removed. They by their presence act as local tissue irritants and as etiological factors in the continuation of the inflammation as well as producing functional derangements and lameness. These deposits are within the tissues or upon the surfaces of the synovial membranes. They persist and are augmented by new deposits as the process goes on.

As this stage of delayed resolution of the acute inflammation continues a tissue change characterized as a chronic inflammatory process begins. This consists essentially of the development of scar tissue in the inflamed area. The acute inflammatory exudates are gradually removed by liquefaction by the lytic substances of the body fluids and the spaces they occupied are filled with this scar tissue. The older the inflammation the more scar tissue there is present and the less exudate in proportion.

Firing has for its chief aim in the treatment of these cases the removal of these solid exudates. It does this by bringing into the inflamed zone a great volume of normal body fluid which contains the necessary lytic materials for liquefaction of the deposits. The free mobility of the exudate from the firing and its freedom from solids permits it to execute these functions and transport the products away without permanently embarrassing the tissue with its own presence.

Firing has no direct effect upon the scar tissue of the area. It cannot remove nor reduce in amount this pathological element of the lameness. However, by clearing the inflammatory exudates out of the tissues, thus removing the chief source of local irritation, the hyperemia and exudation cease and there is a healing. The condition is then known as a healed chronic inflammation. There is no further deposit of exudates and the production of scar tissue is stopped, but that which is present remains, and as is characteristic of scar tissue, it contracts as it ages and to a greater or less extent erases the anatomical defects and correspondingly the physiological derangement. Thus it is seen, first, that firing in this group of cases has no place as a treatment in the acute stage; second, that its greater sphere of usefulness is in the stage of delayed resolution of the acute inflammation and in the earlier part of the chronic stage; and third, that the benefits derived by the firing of the more-advanced chronic cases will vary inversely with the age of the inflammation.

The efficacy of firing on a given case of this kind depends upon certain features of its application. In the first place, the degree of cauterization must be sufficient to produce a maximum of reaction but without devitallization of the immediately exposed tissues. Secondly, after the acme of the reaction is reached, which is in from four to six days, the care of the fired part must be such that there is a steady and continuous recession of the acute inflammatory phenomena until complete resolution has occurred. It is by this flooding of the area with an abundance of enzyme carrying body fluid and its prompt and complete removal that we hope to get results in this group of cases.

The second group of cases yielding to firing as a treatment includes the long-standing panarthritic inflammations in which the only hope of improvement is in an ankylosis of the involved bones. The purpose of the firing in these cases is diametrically opposite to that in the first group mentioned. Here it is for the purpose of continuing and augmenting the existing inflammation and of encouraging the further hyperplasia of tissue so that the articulation may be obliterated. The early stages of these inflammations respond to firing as outlined under the first group. Thus a coronary periarthritis, an intermetacarpal ligamentitis or a tarsal arthritis, if detected early and fired, will clean up perfectly and leave no anatomical defects. If allowed to go unchecked the ringbone, splint or spavin will get beyond such possibilities of treatment and another course must be pursued.

While the technique of application of the treatment is much the same as in the former group, the aim, is different. There is not the same necessity of a maximum of reaction and the longer the inflammation persists the better the results. Point firing is used in these cases as opposed to line firing in the first group, the purposes being better subserved by these methods of application of the cautery.

The third group of cases in which firing may be used is in the non-inflammatory muscle and nerve atrophies and degenerations. I do not recommend firing as being very efficacious in these conditions, but occasionally line firing over the faulty organ, by stimulation of nutritional functions, may be an aid in the treatment.

Patients are fired in the standing position unless they are exceedingly rebellious, in which case they are cast and tied. A hood, a twitch and a side-line are usually sufficient. The area to be fired is clipped and lightly brushed. It should not be shaved, washed nor severely brushed. It is essential that a covering of hair and epidermis be present, so that the cauterization may be confined to the line or point of contact of the iron, and that the interspaces will be partially protected from the heat of radiation. A 10 per cent. cocaine solution is used for anesthesia. From 3 to 5 minims are injected into the subcutaneous tissue at points two inches apart over the entire field to be fired. After a delay of ten to fifteen minutes, to obtain full effect from the cocaine, the patient is restrained and the application of the cautery begun.

For the first and third group of cases as described above the line or feather firing is done. This consists of burning the skin in lines, using for the purpose a suitable copper or iron instrument which is heated to a degree (a cherry red) sufficient to readily char the tissues but not incinerate them. The lines of firing will leave the least blemish when they are made at right angles to the direction of the lay of the hair or at only a small angle to this line. In firing certain parts, notably the coronet, it is necessary for best results to run the lines parallel with the hair direction, although the resulting scar is increased thereby. If the edge of the firing iron be directed slightly upward so that the depth of the burned incision is parallel with the direction of the hair follicles the resulting scar will be lessened. The cauterization should extend to the deepest part of the dermis but should not open into the subcutaneous spaces. Over bony and other prominences it is necessary to use care in this connection and especially so if the iron be superheated. The lines should be spaced evenly about $\frac{5}{8}$ inch apart. For sake of appearance the lines should be parallel and straight. In certain locations diverging lines are permissible. Checked or crossed-line firing may also be used in certain areas where the skin will stand a high degree of cauterization.

In firing for a given condition the fired area should extend considerably beyond the border of the diseased area in order that the reaction shall be sufficient. Suitable designs to cover the surface of the part with lines of correct relation should be formulated. As a maximum reaction is wanted in these cases the cauterization must be as severe as the skin of the part will permit. By a variation in the depth of the lines and a variation in the exposure of the interspace to radiated heat one is able to vary the degree of irritation. Flexor surfaces of joints must not be fired as severely as extensor surfaces; thin skin with a light coat of hair will not stand as much irritation as a thick skin with a heavier coat of hair. No rules can be laid down for these points in the application of the cautery; judgment and experience are necessary in getting the correct degree of irritation, a degree that will get results without the danger of devitallizing the burned skin.

In the cases of the second group the point firing is used. It is the aim here to allow the point of the cautery to penetrate through the skin and subcutaneum into the periarticular exostoses. It is intended that the firing shall augment the process already present and most attention is directed to the immediate area of the disease. The fired area is less extensive, relatively, than that in line firing and the irritation is made especially severe and deep over the diseased tissues but not at other points. The fired points for appearance must be in checked rows, and for best results must be about $\frac{3}{4}$ inch apart. For the third group of cases line firing is used.

When the firing is completed the area is covered with a vaseline or lard ointment containing a vesicant drug. Usually cantharides is used and in a mixture of 1 to 14 of the menstrum. The patient is then tied in a suitable stall so that it cannot lie down nor reach the fired area with its muzzle. It is left so for forty-eight hours, at the expiration of which time the fired part is washed with warm water and soap to remove the blister ointment and such collections as may have accrued. The area is then allowed to dry and is covered with vaseline or lard or other bland oil. The patient is then turned into a box stall and made more comfortable. Every second day the washing and oiling of the fired part is repeated, until the crusts formed as results of the irritation are loosened and removed. This takes from twelve to fourteen days. The application of oils is then discontinued and instead the part is subjected to a cold shower two to four times daily. The granulating lines often need applications of mild astringents at this time. As a matter of fact astringent washes may be used as a routine from the time the crusts are removed until the fired lines have completely healed.

The above method has proved to be efficacious as a post-firing treatment. It insures a good healing of the cauterized skin and minimizes blemishes and it assists in the regression of the inflammatory phenomena.

It is a rule with us that at the time the crusts are removed, that is on about the twelfth to fourteenth day, gentle exercise of the patient is begun. This hastens the removal of the œdema and promotes recovery from the effects of the firing. This is judiciously increased from day to day but is never made at all severe.

By the middle of the third or the beginning of the fourth week after firing the acute phenomena attending the process have disappeared; the edema is gone, the lines of firing have healed and the new hair is well started. It is then time to turn the patient out to pasturage. I wish to emphasize the importance of this part of the post-operative treatment. It is during this run at pasture that those processes occur which insure against a continuation or recurrence of the inflammation. The terminal portion of the inflammatory exudates are now removed from the tissues, the scar tissue present becomes well organized and shrinks and there is a general restoring of the structures to a normal condition. These processes are most active in the fourth and fifth week after firing, but they are not completed until three to six months have elapsed. We have had cases in which the fired structures have improved continuously in appearance, in tone and in function for twelve months after the application of the cautery. Patients do not do nearly so well at this stage if confined in a stable, even though only for part time, and they do very poorly if put to work. The run at pasture should be for not less than two months and the longer the time the better. The season of the year makes no difference in this rule.

There are but few really important contraindications to firing. In some cases the blemish that follows firing precludes its use in the treatment of lameness in the high-class horses, especially when such disfigurement is distasteful to the owner. We do not under any circumstances fire a neurotomized part. Such a procedure is very apt to result in disastrous trophic disturbances in the limb. Patients suffering from any acute febrile trouble must not be fired because of the increased danger of skin necrosis under such conditions. It is not an uncommon thing to have patients brought into the hospital to be fired when they are in the incubationary period of an acute infectious disease and have them develop the disease at the time of the height of the firing reaction. We find this combination an unfortunate one, as each condition is made more severe by the presence of the other.

The subject of complications of firing is a more extensive and important one. Necrosis of the skin of the interspaces is a very common complication. It is always a danger because the operator is anxious in every case to get as high a degree of cauterization as the skin will stand. Skin necrosis is due to the devitallizing action of the heat. Using too hot an instrument, moving the heated iron over the surface too slowly or repeating the cauterization too often, usually explains skin necrosis. Considerable experience is necessary to successfully guard against this complication.

The opening of important joint cavities and tendon sheaths is another complication resulting from unexcusable error on the part of the operator. This is most frequently done with the point iron, but occasionally the careless use of the too-hot feather iron will open a bursal cavity. The only areas in which it is permissible to allow the iron to penetrate deeper than the skin are the areas overlying bony new growths. It is perfectly safe to allow the hot point iron to penetrate into a splint, a spavin, a ringbone or other similar exostoses. Under no conditions, however, must bones, ligaments, tendons or other normal structures be penetrated.

The puncturing of arterial trunks, with severe hemorrhage, is sometimes a complicating condition. It will not often occur to the careful operator.

Accidents of restraint, injuries to the fired area during progress of the inflammation and infection of the granulating surfaces are some of the less frequent associated conditions. Tetanus and even septicemia have been recorded as complications.

Mild or even severe laminitis may make its appearance during the course of a firing reaction, especially if more than one limb is fired.

The chief sequel of firing is the blemish left by the healing of the cauterized points or lines. If executed properly, firing leaves but a light blemish, but if there has been some irregularity in the technique or some complication the scars may be large and most unsightly. Skin thickenings, contracted and distorted tendons and ligaments and hairless scars are some of the disfigurements that mark the cases of the careless operator.

Dr. Williams: Gentlemen, you have heard a very interesting paper upon an important subject, and it is now open for discussion, and I trust that you will discuss it freely.

Dr. Cotton: Mr. Chairman and Gentlemen: I do not think that I am qualified to open the discussion, but I would like to ask Dr. McKillip if under any circumstances he recommends puncture firing into a hygroma or an enlargement of the great sesamoid sheath?

I remember in my early days I followed the lines that Dr. McKillip has outlined; that is, hesitating to puncture sheaths of tendons. Some two or three years ago I had occasion to travel through the South, and met with a number of veterinarians who said that they in the early days were afraid to do these things, but as a result of their work upon running horses, and being induced to do radical firing by the owners of such horses, they had become almost fearless with respect to the depth to which they introduced the point firing into hygromas or distention of the tendinous sheath. I saw some wonderfully courageous firing with apparently good results in chronic tendovaginitis, or enlargement of the great sesamoid sheath, and I would like to ask Dr. McKillip if, under any circumstances, he recommends the puncturing of this sheath?

Dr. McKillip: In some cases we do practise puncturing the sheath, especially in a bog spavin, for instance; but we really do not recommend it, on account of the wound afterwards being liable to become infected. We know if it does become infected what the outcome will be under those conditions. That is my opinion about puncturing those structures, although with the iron in the hand of a careful operator, under proper conditions, it is permissible to puncture those parts. There is so much danger of getting them infected that I am afraid of it, however.

Dr. Berns: I would like to ask if the danger of getting infection in a case of that kind would not be considerably lessened by the application of cantharides or a similar agent immediately after the firing into a sheath of that kind?

Dr. McKillip: It may be, but I think the infection probably occurs after the effects of the cantharides have worn off; that is, the wound becomes infected two or three days afterwards. It may often become infected a week afterward.

Dr. Berns: After the blister has expended its force, say in twenty-four or forty-eight hours after the application, and scabbed over, is there very much danger then of infection?

Dr. McKillip: Well, yes; a great many times in our practice a fired patient has been returned to the owner and although having splendid care the wound has become infected. It seems to me rather injudicious to do that kind of firing.

Dr. Berns: It seems to me that if a patient suffering from a condition of that sort is kept as quiet as possible the wound will close in a comparatively short period of time, provided it is given protection. The discharges from the blistered surface will act as a protection, and form a scab over the entire surface in a comparatively short period of time, say two or three days or three or four days; and if the patient is kept comparatively quiet during that time I think there is not very much danger of getting infection.

Dr. Williams: The Chair would like to ask Dr. Frost to state his observations upon this point, comparing the plans which Dr. McKillip and Dr. Berns have discussed with the plan of applying cantharides and biniodide of mercury to the fired part, and over that applying a permanent bandage to remain in place for seven to ten days, whether we get as much infection that way or not. I think we have done that several times. Would you state to the meeting, Dr. Frost, your observation upon that point?

Dr. Frost: We cover the blister with a bandage. I remember one case where we did not do that. In our practice a good many of the patients are taken directly away from the college, and in one case I remember the part was fired and the animal was taken away. The owner was a foreigner and it was rather difficult to have him understand just what care was needed. We could give him very little direction as he did not understand our language, and owing to the lack of care there was severe infection and later on the animal died.

In treating those cases we use a tar bandage now. We cover the blister with a piece of cotton and tar, and, bandaged in that way, it keeps out infection and we have good results.

Dr. Williams: The Chair would like to ask if others have had experience regarding the application of a bandage over a blister following firing? In our clinic it certainly has given us much better results than leaving it open. I have called on Dr. Frost to bring out his observation and our experience at college, and the Chair would like very much to have others speak upon that point, because I believe that the after care of the part is one of the most important things.

Dr. Berns: I have always been a little bit afraid of adopting that method. I should think it would be practicable. I have never practised it, but I should think it would be a safe procedure if applied to a part with limited motion. Now, on the ankle, or just above the ankle, where the motion is limited, I think a bandage would probably serve a very useful purpose; but when you come to the hock joint I should hesitate very much.

Dr. Williams: I will say to Dr. Berns that that limits the motion; that is one of the very objects in putting the bandage on.

Dr. Berns: Yet we have some horses that will fight the very moment you attempt to bandage a hock, and if they do fight it is difficult to keep the hock in position. If you put on a mechanical appliance that is sufficiently strong to keep the hock in a rigid or fixed position, skin necrosis is very apt to follow; that is, I should think it would.

Dr. Williams: We put on the tar bandages tightly enough upon the hock so as to limit motion to a minimum, and do not get skin necrosis.

Dr. Adams: I will simply state my practice that has been gradually formed through long experience. When I was a student it was the practice, after point firing of a spavin in a horse, to put on a blister immediately.

Very often the result was good and quite frequently there was sloughing of the skin clear to the outer circumference of the fired area. That depended a little upon the reaction of the tissues, which we know varies a great deal in different individuals, and we never know whether the individual beforehand is going to react or not. In other words, on one horse it produces severe sloughing, while on another horse it hardly produces reaction. We know that the lymphatic, thick-skinned horses do not react as severely as the thin-skinned, better-bred horses; but among well-bred horses of the same breeding the same treatment is followed by greatly different results so far as swelling is concerned. In point firing for spavin I think it is much safer to wait until the swelling caused by the firing begins to go down before applying the blister. We do not know beforehand what the amount of irritation is going to be, and I think it is safer to wait and find out than to apply a double dose to the skin, the circulation of which has been quite largely cut off by the punctures we have made in it by the hot iron.

Now as to the danger of sloughing of the skin from point firing, a little bit depends upon the diameter of the iron. A good many use the olive-pointed iron, a little cylindrical iron that might be represented by the end of a sharpened leadpencil, but an iron that perhaps is three inches long and an inch and a quarter, perhaps, thick at the butt. If the horse is a meaty-legged, thick-skinned, lymphatic horse, the bone often lies deep, and by the time one of these conical irons has reached the periosteum the diameter of the hole is pretty large. I have seen it as large as a ten-cent piece. When you have driven the iron home, the circumferences of the holes are not far apart. There isn't much circulation getting into that skin, and I do not care to put a blister on top. In fact, when the bone is far from the skin I advise using a cylindrical iron, so that the hole in the skin won't be as large when the iron is driven home. My practice is to wait for four or five days until I notice the swelling caused by the firing just beginning to go down, and then I put on a blister. But on the hock I never have learned how to put on a bandage that would not do more damage than what it was worth. I have built them up from the fetlock; that is the best place, it seems to me. Use the fetlock as a support and build your dressing up with cotton, and then with oakum, until you can cover over part of the hock. But I do not like to do that because I find that when my dressing touches the horse around the hock he is inclined to flex the hock, and after two or three flexes he has tightened it up. I think it is a provocative of flexion rather than anything that does any good. If you put a bandage around the hock and cross it, putting very much around the achilles tendon, you cap the hock, providing you put the bandage on tight enough to stay. I do not attempt to bandage them much.

Now in line firing over the sesamoid sheath or over the tendons, for tendinitis or chronic serous tendinitis (although in the latter case we rarely have a line firing), over a thick skin I think it is perfectly safe to apply a blister. Immediately after the firing I apply a red iodide of mercury and cantharides blister, in the proportion of one dram of cantharides, one dram of red iodide of mercury with one ounce of lard or cosmoline. I always cover with dry cotton, and then I put on an elastic bandage, like a knee bandage, a stockinet or a flannel bandage, and over that silicate of soda to stiffen it and keep it from slipping down. I leave that bandage on a week or ten days, with plenty of dry cotton to take up every bit of the serum that will form, and I never have much sloughing. That is the common practice all through the countries of Europe. Put on the red iodide of mercury blister good and strong, rub it in until you get tired, smear on any excess, and cover with wood wool or with the cotton, and then bandage, That is the general practice in the government schools. In order that the bandage may not become disarranged and slip down, I stiffen the outside with ordinary soluble glass, such as you might use for a splint dressing on dogs; it dries in a few minutes, it is cheap and easily applied—more easily than plaster-of-Paris.

I do not intend to give the idea here that it is safe to point fire tendon sheaths or joints. Nobody can make me believe it. Of course I know that the smaller the point and the better the part is protected afterward, the less the danger of infection, but I have seen too many serious infections of the tendon sheaths and joints from point firing. The smaller the point and the better the part is protected either by dressing or by blister afterward, the less the danger; but these men down in New Orleans, who do not hesitate to puncture through the leg into the sesamoid sheath, simply do so because they do not know of any better method.

Dr. Merillat: Mr. Chairman, I wish to second Dr. Adams' statement in that regard. I believe that a man in veterinary practice who deliberately punctures distended bursæ or capped ligaments will soon be swamped with the consequences of his recklessness by the production of a large number of cases of articular and thecal abscesses. I do not believe that Dr. Cotton meant that seriously when he said that he did not hesitate to puncture into a bog spavin. I think that is unwise treatment.

Dr. Cotton: Mr. Chairman, if you will allow me, I did not intend to convey the impression that I do it. I stated that I had always been afraid to do it, but that when I went through the South and saw people puncturing and puncturing, and synovia running out of all of these places, I simply came home with more courage to use the hot iron. I do not want to convey the impression that I make a practice of that. I was dumfounded when I saw this, and they told me that those who were practising on running horses were absolutely fearless in the use of the iron. I saw one case where there were at least sixty punctures into the sesamoid sheath and synovia running out of them, and later came the report that the animal made a good recovery. I did return with much more courage. I do not want to leave the impression that I practise that; I am afraid of it.

Dr. Williams: What was the nature of the treatment, Dr. Cotton?

Dr. Cotton: They simply applied a blister, and apparently there was no antiseptic treatment afterward whatever. I saw the synovia dropping. There was synovia on the floor the second day after the operation.

Dr. Rogers: There has been considerable talk about blisters here, but I have not heard anything said about the quality of the blister. Now it lately fell to my lot to make a number of experiments on blisters. I should not expect to get very good results from a blister prepared according to the method outlined by Dr. Adams. The best way to make a good cantharides blister is to make it a year before you wish to use it, in the first place, and secondly, to make it as far as possible with an animal fat. This is worth really making a note of. The experiments of which I speak were conducted over a number of weeks. If you will take the cerate of cantharides of the *Pharmacopœia* of 1890, and rub that cerate of cantharides down to the consistency of an ointment with equal parts of olive oil and turpentine, you will get a blister that will blister, and when it has blistered it is through with it. You do not need to wash it off. I do not think you will get a good blister unless in thirty-six to forty-eight hours you have got a crop of very big vesicles and you have a good full discharge of serum running down the limb. Now when you have that your blister is through; it has lifted up away from the surface that it has blistered, and it will not blister any more if you should leave it there for a month. I think you will get very much better results after you have got that blister where you want it if you will never wash it at all. Just apply a dry dressing to it, and do not touch it until the scabs drop off. If you use the blister of the present *Pharmacopœia* you will not get an equally good result. I speak from an extensive experience in experimenting with it.

Dr. Gill: I did not hear the whole discussion, but I simply wish to speak on opening bursæ. There seems to be an impression that it is bad surgery to open a bursa. All around this room there are men, three of whom I can point to, who have opened bursæ for the last five years. I have no hesitation in opening up a hock bursa, none whatsoever, and we do not have any infection. I think it is the best treatment and I will give you my reason why I think so. I believe that distended bursa of the hock, so-called thorough-pin, is continued for the reason that the synovial cells are excited by the pressure. If you relieve that internal cellular pressure, Nature is going to bring back an equilibrium, so to speak, in the function of the synovial membrane, and the swelling will gradually recede.

Many of you may be speaking from a hospital practice and not from a general practice. You understand what I mean. It is bad practice to open a bursa in a dirty stable where the only attention it will receive will be that which you give it daily. If you can get the horse to your hospital it is all right. There is a man here at my right who opened one only two weeks ago and allowed the synovia to flow out and he got no infection at all. It seems to me that if the pressure is from within and the secretion of the synovia is going on, the tendency is for the synovia to come out. Now I have no hesitancy in opening up windpuffs. It is the general practice in New York for the treatment of thorough-pin and windpuff. There is not the slightest danger. Dr. Shaw here, and I think Dr. Cochran, and there are others here to whom I could point, that do that and have done it for the past twenty-five or thirty years in their general practice. I used to be of the same opinion that was expressed here that you should not open up a synovial bursa. It is done in this city every day, and if you do not apply that sort of treatment you would not get very many of those cases, because they want the work done very quickly as a general rule and that is the quickest way to do it.

So far as hock bandaging is concerned, I have had some very bitter and sad experiences in bandaging hocks, in the shutting off of the circulation and general suffering. I have been placed in some very embarrassing positions by applying a bandage or suggesting that one should be applied. I want to say most emphatically that there is no danger in opening thorough-pins and so-called wind-puffs.

DR. ADAMS: I would like to know how the Doctor opens them; with a bistoury or with the hot iron?

DR. GILL: Both ways. Take a bistoury and open them up. Where the bursa becomes infected I recommend washing out or flooding out with a solution of peroxide. Just wash out all the pus, and keep at it, not doing it twice a day, but you should have a man stationed right there to keep at it with a hose and a siphon, and allow the fluid to run into that sac. You will see the pus coming out and growing thinner and thinner all the time until the infection disappears and the animal gets well. I have had cases of punctures from forks where there has been a very serious injury, the leg being all swollen, and I have applied that treatment only and made a radical cure.

DR. ADAMS: When you used the word "bursa" I would like to know what you mean. I want to know whether we are speaking of a complex tendon sheath or of a little ill-defined looseness of the subcutis, a subcutaneous bursa. I supposed we were speaking of this large complex tendon sheath of the fetlock that we call the great sesamoid sheath.

DR. GILL: I was speaking of bursæ.

DR. ADAMS: We are talking about the great sesamoid sheath. Now of these two methods of opening the great sesamoid sheath, which is safer, the bistoury or the hot iron?

DR. GILL: The hot iron. I had just as soon use the bistoury if I had the animal under my care. I have no hesitancy in opening the sheath if I can keep things clean.

DR. ADAMS: What is the diameter of your firing iron? Is it like a knitting needle?

DR. GILL: I use a small thermocautery. I very seldom have any sloughing with a small puncture. I use a counter-irritant that can be applied every day or twice a day and I keep doing it. The effect of the blister wears away in a short time and often you have to add croton oil. Very often you can use a blister on certain horses which will not produce good results on other horses, bearing out your own remarks along that line. I believe in applying a counter-irritant of cantharides, tincture of capsicum and biniodide of mercury, and I always add menthol or thymol or similar agents. Those are the best agents that I know of and the results are extremely good. It seems to me if you want a counter-irritant you should keep it up; your blister wears away in a short time. You know that it is a well-known fact that horsemen claim they can sit down with an ivory handle of a fork and rub away a splint. That is constant irritation, and I believe constant irritation is a necessary adjunct to natural repair. It is circulation that makes repair, and if you keep the circulation up, and keep the irritation and the pressure up, it seems to me you are assisting Nature in a better way. At least I find it so, and I have discarded the blister and I use a counter-irritant which can be applied more continuously and with better effect.

Dr. Adams: Well, I do not think any of us will hesitate to slit open an infected suppurating tendon sheath. That is good surgery. If we have occasion to believe that we have suppuration of the great sesamoid sheath from a puncture of the tine of a dung-fork, we should not hesitate to slit it open, top and bottom. That is good surgery, and those cases do not *all* die; they do not *all* die.

As between opening a tendon sheath with a bistoury and with a rather, coarse hot iron, I should think it would be rather much safer to open with the bistoury than with such an iron. If the iron was small, I believe the swelling that would follow the introduction of the iron would tend to close the wound. So I think you would have to make a distinction there. I have not been at all convinced by what the doctor has told me, although I have listened, and I give him credit for his experience. It does not coincide at all with my experience.

I want to ask another question: do I understand that you do not hesitate to open the tibia-astragaloid articulation; that is, the true hock joint?

Dr. Gill: I say if the conditions indicate it.

Dr. Adams: Well, what is the condition to indicate it?

Dr. Gill: Well, if you have any suppuration there, I should think that would indicate it, and if we had a distended synovial sheath there, that is, if the articulation itself was involved.

Dr. Adams: If the horse had what is called bog spavin?

Dr. Gill: Yes. I don't mean, by that, dilatation or blood spavin; I mean bog spavin.

Dr. Adams: I never saw a blood spavin yet.

Dr. Gill: But may I say this, that I find that the best treatment is to keep your horse moving so as to induce circulation. I have taken a trotter, and have done it repeatedly (it has occurred right in a race), and applied an agent to dull the sensibility, and it has worked successfully. I believe that if you stop the pain and then apply the counter-irritant, the circulation is increased and you will make a much quicker repair. It seems to me inconsistent to allow a horse to stand in a stall for days at a time and expect the circulation in the hindleg to be perfect, or to be anywhere near perfect. I think one of the essentials in the cure of lameness, or any disease of that kind, is to keep your animal moving and compel him to move. If he is so lame that he cannot do so, then try to dull the sensibilities, and that is the secret of a quick convalescence in such cases.

Dr. Jensen: You perhaps remember, some of you, about eight or ten years ago, Dr. Klotz, of Indianapolis, recommended the opening of these bursæ. I was very much elated over what I heard at Indianapolis;

I had been told that he opened a hock joint. On my return home I opened one and it evacuated thoroughly, and in one or at the outside two hours after, it was as large as it was before. A day or two later I opened it again with the actual cautery and succeeded in keeping it open. Personally I have not had any ill results but once from the opening of these thorough-pins; but I do not believe that the ordinary opening that I have nerve enough to make with a knife is of any value, because in my hands they invariably close up again; whereas if I open them by the actual cautery I am at least able to keep them open for a few days.

Dr. Williams: This is a very interesting discussion, but I am reminded that our program is long and unless there is something that is quite important more to be said we will close the discussion. Through some error one paper was omitted from the printed program and we would like to hear now from Dr. Cochran upon "Hip Lameness."

LAMENESS OF THE HIP-JOINT

By David W. Cochran
New York City, N. Y.

The subject allotted to me by Dr. L. A. Merillat to be read and discussed at this meeting is "Lameness of the Hip-joint." The hip-joint is formed by the articulation of the femur with the os innominata. It is an enarthrodial articulation, an articulation which permits the most extensive and varied movements. Every movement of the hip is the act of contraction of one or more of the muscles of the part, which as it acts on the bony levers causes the movements of flexion, extension, abduction, adduction, rotation or circumduction. Flexion is freer than extension. Of the lateral movements, abduction is the freest, unless flexion be combined with adduction so that one limb passes in front of the other, while circumduction is much less free in the hip than in the shoulder. It is the rapid alternations of these movements which produce the different positions and various gaits of the animal; and it is their derangement from normal conditions, no matter from what cause, which constitutes the pathology of lameness.

Lameness may be defined as any irregularity or derangement of the function of locomotion affecting one or more extremities, involving the inability of the patient (according to the extent of the injury) to sustain the body weight, due to pain, from disease or injury to muscular or nervous structure, disease of synovial capsules, softening and disintegration of ligaments, ulceration of cartilage, necrosis of bone. We may classify lameness under two headings: one, a swinging leg lameness and the other a supporting leg lameness. Under the first heading will be disordered condition of muscular tissue. Under the second, those which support the body weight, namely, hoof ailments, rupture of tendons, luxations, fractures, synovial dilatations (either thecal or bursal), nerve lesions. To summarize: In hip lameness we may have the joint proper as the seat of disease, also the ligaments, the tendons of the gluteal muscles and the muscles themselves, the bones comprising the os innominata as well as the greater and lesser trochanters of the femur.

Under the heading of swinging leg lameness we will consider sprain. In defining sprain, we will say it is the wrenching of the structures which form a joint, in which we have more or less laceration or stretching of muscular fibers, tendons or the sheaths surrounding or supporting them. It is probable that there is in every case of severe sprain more or less injury inflicted upon the parts in the immediate relation of the affected joint. The muscles and tendons must necessarily participate in the wrench. Ginglynoid or hinge joints suffer more than orbicular joints. Orbicular joints possess more latitude and freedom of motion. There is an essential difference in the structure of the ligaments themselves in the two classes of joints. In orbicular joints the connecting media are of a fibrous nature, comparatively thin, yielding and extensible. In the ginglynoid the ligaments are extremely firm and indisposed to stretch, or when strained are incapable of withstanding rupture of their fibers.

The causes which are likely to result in sprain of the hip are sliding or falling on the ground surface, when the hind legs are suddenly thrown into extreme abduction, or any extreme effort accompanied by a powerful contraction which may cause laceration of the soft structures, due to loss of control on the part of the animal, or if held in forcible operative position either by hobbles or stocks, or to holding back or backing up a heavy load or a misstep followed by a powerful exertion of strength in preventing a fall. This is followed by inflammation and suspension of function.

Muscles are liable to wounds and lacerations, inflammation, atrophy and hypertrophy. Laceration (rupture of muscles) is often produced from slight injuries. The place where the rupture occurs is near the junction of the fleshy fibers with their tendons. Occasionally a muscle may give way at its middle or in fact at almost any portion of its extent. The laceration is sometimes limited to a few fibers; at other times it involves the entire thickness of a muscle and its aponeurotic sheath. Finally, cases occur in which a number of muscles are ruptured. They are, as has been stated, the result of some violent bodily exertion. Temporary lameness and inability to move about for some time are generally the only serious consequences to be apprehended until the reunion of the torn structures will be sufficiently firm to justify their accustomed use.

In inflammation of muscles, the sheaths of the muscles very frequently, if not generally, participate in the morbid action. One effect of inflammation of the muscles and their fibrous envelopes is contraction of their fleshy fibers, leading to marked disorder of their function. We may have atrophy of muscles caused by defective circulation, inactivity or whatever has a tendency to impair the function of innervation, retard or diminish the supply of blood or induce inactivity in a muscle. When contusion is severe, we may have a paralysis, due reflexly to injury of the articular terminal fibers of the obturator or branches of the sacral, or directly from contusion of the sciatic as it passes behind the trochanter. The muscular spasm may be reflex and a sufficient cause is found if we suppose the nerve terminals are injured. We often have associated with hip lameness symptoms of stifle lameness through contiguity of structure.

Wounds of tendons when divided subcutaneously readily unite through the intervention of plastic matter without the occurrence of any considerable degree of inflammation. There are many conditions in which not only the muscular and tendinous structures are affected by sprain but by contiguity of parts the supplemental structures may be involved with complications, as periostitis or callouses. The true seat of pathological lesions is often uncertain owing to the massive structure of the parts.

Under the heading of the second division I have made, I will mention luxations of the hip. I have never had any in my practice, nor have I ever seen one in the horse, although cases are on record where the accumulation of synovia was so marked that the femur would slip out of the cotyloid cavity. The diagnosis of this condition would be difficult and would only interest the pathologist and not the practitioner. It would seem almost impossible to have luxation of the coxo-femoral joint from the way the joint is held in postition by ligamentous structure.

Under the heading of fractures, I beg to say that in looking over several works on human surgery there is very little mention of fractures of the pelvis, but there are volumes written on fractures of the femur, for the human pelvis is stronger, more dense and compact in proportion to its relative size than any other animal. Accidents to the human being in the pelvis are generally the results of railroad accidents or are due to the person having been run over by a heavy vehicle. Not so with the horse. We have more fractures of the pelvis than the femur. In the coxal region, we have the union of three pairs of bones—the ilium, the ischium and the pubis—forming the whole of the pelvis. Fractures in these bones are caused by external violence and may involve the ilium, the ischium and the pubis, the cotyloid cavity or several of the parts together. The ilium is frequently injured at its antero-external angle. Sometimes a single tuberosity is broken off and remains attached to the bone. Crepitation is hardly perceptible. Sometimes it is completely loose and is more or less drawn downward by the contraction of muscular tissue. There is generally no crepitation discernible, but there is a noticeable loss of symmetry in the appearance of both sides. The lameness is peculiar. One of the earliest symptoms is a sideway progression due to a slight curvature of the spinal column. This in turn is caused by a loss of contractibility of the ileo-spinalis muscle, due to the fracture of the attachments of this muscle at the angle of the ilium.

Secondly, the ischium. Fracture of the ischium is also the result of external violence, but I think most cases of this kind are the result of powerful muscular contraction. I have seen several cases in cart horses that were compelled to back up heavy loads. There is a peculiar deformity of the croup, a flattening at the height of the ischial tuberosity, an abnormal projection on a level with the articulation of the hip. The gluteal region is larger and more prominent. The prominence is the result of a luxation forward of the posterior portion of the long vastus. While forward motion is limited, progression backward is almost impossible.

Thirdly, the pubis. We have fractures at the symphysis pubis. This is due to falls. The diagnosis is made by rectal exploration together with manipulation of the leg (by an assistant) in all the varied movements of the hip, for the crepitation test.

We have three other fractures which are of a more serious nature, those in the vicinity of the cotyloid cavity: (1) of the neck or shaft of the ilium; (2) surrounding the obturator foramen; (3) of the cotyloid cavity.

When the fracture has taken place anterior to the cotyloid cavity, beside the lameness there is a shortening of the step forward, the foot resting on the ground surface firm. If it is posterior of the cotyloid cavity, there is pain and stiffness while resting. Forward motion is limited. Backward motion is positively restricted. When at the cotyloid cavity, the pain is intense and lameness severe. It is generally complicated with arthritis. There is no flexion at the hip.

While I have confined myself to the pelvis, I might say that there are two fractures of the femur met with, those of the greater and lesser trochanter.

Every variety of complication, including muscular laceration, the formation of deep abscesses, and injuries to the organs in the pelvic cavity, the bladder, the rectum, the uterus, may be associated with fractures of the hip. Fractures in and near the cotyloid cavity may cause disability of the patient, as when the reparation process has left bony deposits in the pelvic cavity at the seat of union, which may induce local paralysis by pressure on the nerves which govern the muscles of the hindleg. This is a condition which is seen when callouses have been formed at the floor of the pelvis near the obturator foramen, pressing upon the course or involving the obturator nerve.

TREATMENT. In cases of sprain, the treatment will depend on the severity of the case. Hot-water applications and hot packs, stimulating liniments, vesicants, setons, actual cautery, either superficial cautery or subcutaneous cautery, intermuscular injections of normal salt solution, tr. iodine, spirits of turpentine. For fracture, place the animal in a sling and prevent motion as far as possible.

DR. WILLIAMS: Dr. Cochran's paper is now open for discussion. I believe the Chair erred in allowing a long discussion on the previous paper, and we will not have time to get through with all of our program if we discuss this one as fully as we did the other. Kindly be prompt and confine what you have to say to things that are of importance, and there are many things of importance to say in regard to this paper.

Dr. Berns, will you start the discussion?

DR. BERNS: Dr. Cochran has covered the subject so well that I do not think there is very much room for discussion. I fail to find a single point that I can make an objection to. I think I will have to let somebody else discuss and criticise his paper.

DR. WILLIAMS: Does anyone else wish to speak upon this subject?

DR. MERILLAT: I think there is one omission in the paper that ought to be mentioned and that is what I have always found to be about the most common lameness in the hip, trochanteric bursitis. We have performed some operations for this lameness with varying degrees of success, consisting of cutting across the tendon, scraping and discharging the synovia. Sometimes we have been successful and at other times we have not done so much good. Probably the Doctor mentioned this lameness, but not having been able to hear all he said, I thought I would add this much to his presentation.

Dr. Roule: Dr. Cochran said he never had a case of hip-joint lameness.

Dr. Cochran: In a horse?

Dr. Roule: I had two in the mule, and I should be interested to know if they were more predisposed.

Dr. Williams: Was there a fracture of the trochanter with it?

Dr. Roule: No.

Dr. Williams: I would say that I have seen two cases of dislocation accompanied by fracture of the trochanter major.

Are there any further remarks to be made? If not, the discussion will be closed.

We will next listen to a paper by Dr. George B. Jones upon the subject of "Oöphorectomy and its Economic Importance on Small Farms."

Dr. Jones: Mr. Chairman, I am not much at drawing pictures, but I have presented here a sort of a rude outline of the position of the stocks and also the animal. I will show you the kind of an instrument that we are using (exhibiting instrument).

OÖPHORECTOMY AND ITS ECONOMIC IMPORTANCE ON SMALL FARMS

By George B. Jones
Sidell, Ill.

Generally speaking this subject has been given but little attention the last few years by the professional veterinarian. From the point of operative surgery it has been classed as a simple operation and easily performed by most any person.

During the period of cheap beef, cheap land and open ranges considerable spaying was done or attempted, especially in the large herds where the cattle were not fitted for the market until they were about three years of age. The mode of spaying in these herds was very vague and the per cent. of mortality was great, yet the losses were not seriously considered on account of the low prices of the animals at that time. Today free cattle ranges are a thing of the past and cheap beef won't be produced by the farmer whose land is worth from one hundred up to two hundred and fifty dollars per acre for the grain production.

From a commercial point of view the subject of oöphorectomy in heifers will soon be brought forcibly to our notice on account of the high prices of beef products. All farmers as well as the dairymen raise a few female calves every year, which for some reason or other they do not wish to keep for breeding purposes. The dairymen don't wish to keep a female calf for a breeder if her dam proves to be no good as a milker, neither does the farmer. As a result of this feeling many of the heifer calves are rushed off and sold at a sacrifice to the market for veal, while only a few are kept to the age of one year when they are sold for beef. On the other hand, the steer calves of the very same size and quality remain on the farm until two or more years of age when they are marketed at a profit.

The talk of the cattle breeders today is of the "dual-purpose cow"; that is, one which is a producer of both milk and beef. Yet she is only partially dual purpose as long as they allow the heifer calves to be sold for veal instead of being kept on the farm, then fatted and sold for as much as the steers.

To make it possible for the heifer to command as much money for beef purposes as her brother, the steer, the services of the veterinarian are required. In fact, he is the man who can here demonstrate that his services are of great commercial and economic value to the cattle breeder, and while he is demonstrating this to the breeder he also may be able to obtain a little pecuniary profit for himself.

In my community in Illinois spaying heifers was a science that was practically unknown to the average farmer until the fall of 1897, when I persuaded two farmers who were feeders to buy a few heifer calves from their neighbors and let me spay them the following spring. The calves were purchased, yet these men were so dubious of the results that they would not consent to have the work done until I agreed to pay for every animal that died.

March following, I was called upon to do the work. Upon my arrival I found a bunch of yearlings which was very nice and even, though rather thin in flesh. After making inquiries I was informed that the average cost of these animals was about $16 per head and I was also informed by these same men that steers of the same size and quality were selling for $18 to $25 per head when the heifers were purchased.

The heifers were spayed, had no fatalities and all did well. The next year I did more spaying for these two men with good results. Eighteen months after spaying the first two bunches I was told by these men that they had marketed the first bunch I spayed and they had received more money per head for them than their neighbors had for steers which were purchased the same fall at an average of $22 per head. If you add $1 per head for the spaying of the heifer, the actual cost of them would only be $17 per head.

As a result of the satisfactory experience of these two men I soon began receiving telephone messages and letters of inquiry as to my success, and also the advantages gained by spaying heifers. My answer to all inquiries was to phone or write these men for whom I did the work. Now let us notice the results of this practical demonstration to these two men.

1. It has checked the rush of heifer calves to market for veal.
2. It has raised the price of the heifer calf to that of the steer calf of the same size and quality.

3. It has made an animal more docile and a more satisfactory feeder than the steer.

4. It will be one means in assisting to relieve the scarcity and high price of beef products.

5. It widens the field of work for the professional veterinarian.

The question might be asked, why did this operation become so obsolete after it had been practised so many years? In answer to this question I should say that the unsatisfactory results and the barbarous methods of the operators were the chief cause.

I have witnessed this operation from three very different angles, viz., barbarous, semibarbarous and humane. The first or barbarous method reminded me of a dead beef being dragged through a slaughter house. It seemed that the only object in view was for the operator to get his fee for the killing. The second, or semibarbarous method, was where the *modus operandi* was all right except that it was badly mixed with blood, hair and dirt, even water being an unknown quantity.

The third, or humane point of view, was where the operator took all due precaution for the comfort and protection of the animal, both during and following the operation. We can only hope by this last or "humane" method to ever be able to bring the operation into general practice and raise the status of the operation to a higher plane of general surgery.

MODUS OPERANDI. In our treatise on this subject we shall not attempt to deal in all of the different modes of the operation, but the one which with us has been the most successful is through the left flank. The most desirable age for the operation is either eight or twelve months, and that in the months of November and March and April. In the spring and at the age of one year is the most preferable, as the animal is usually thinner in flesh and not so apt to be troubled with flies. The animals that are to be operated upon should be kept in a dry lot without feed the night previous to the operation. The mode of restraint is either the stocks or the common dehorning chute. The latter we believe is the more satisfactory.

If the dehorning chute is used, a section of the panels should be cut on the left side near the point of hip and flank. This space should be nearly two feet in height and three feet long. In the panel of this same side and about six inches above the floor, and at a point near where the left hindfoot would stand, bore or mortice a hole sufficiently large to admit a rope or hopple, with which to securely fasten the leg. If the chute is wide and the animals of different sizes, it is sometimes advisable to have a false panel or gate set in the chute on right side of animal in order to crowd it over to the side nearer the operator.

In order to properly conduct the work three good assistants are needed, namely, one at the head of the animal, one at the rear and one to directly assist the operator.

The other necessary equipment would be about as follows: one bull snap or leader to be used by the man at the head; one hopple strap and ten or fifteen feet of one-half inch rope with which the man at the rear is to securely fasten down the left hindlimb through the mortice to prevent kicking.

The assistant to the operator should be provided with plenty of naptha salve, a pair of common scissors, a sponge, a pair of hand clippers, a stiff bristle brush and a bucket of antiseptic solution. The duties of this assistant would be to clip and brush all loose hairs from the seat of the operation; then with sponge and antiseptic solution thoroughly scrub and clean the parts before the incision is made.

The operator should be provided with plenty of campho-phenique salve to use on his hands and arms, a short plain castrating knife, a spaying emasculator, large sewing needle, heavy suture twine, and plenty of corset buttons; also a large pan of antiseptic solution in which to keep instruments, and plenty of clean towels with which to wipe off the hair and grease from his hands and arms.

The operator, resting his left hand and arm lengthwise near the back of the animal, his right hand holding the knife, should rest the smaller finger and wrist firmly against the flank, beginning the incision about the height of the transverse process of the lumbar vertebra extending downward (maybe slightly forward) midway between the external angle of the ilium and the last rib, making the incision sufficiently large to admit the hand. Care should be taken to avoid severing branches of the circumflex iliac artery at the lower extremity of the incision.

My practice has always been to extend the incision through the muscles and also the peritoneum, but be very careful about the time you make the incision through this membrane that the animal is not bellowing or jumping. After you have made your incision apply a little campho-phenique salve to your left hand and arm; insert the hand inward and backward behind the broad ligament where you should come in contact with the ovary suspended from above; then follow its cornu back and across to the right cornu and up this to the right ovary. Then holding the emasculator in the right hand carefully insert it and crush off the right ovary. Then withdraw to left ovary and crush it off. By this method you introduce the hand but once.

The wound is now closed by taking two interrupted button sutures through the skin and muscles; then the wound is covered with the naptha salve. The only after-treatment necessary would be the removal of the sutures in ten days or two weeks.

DISCUSSION

Dr. Williams: Gentlemen, the paper is now open for discussion. Please proceed promptly.

Dr. Bemis: Mr. Chairman, there is a little difference in technique that I prefer to the doctor's method, and that is in making the incision. I like to make the incision merely through the skin and subcutaneous tissue and then divide the muscles as I come to them with the fingers in the direction of the fibers of the muscle, and then divide the peritoneum by tearing with the finger or by first starting with a small incision. I like the method recommended for introducing the hand at once and removing both ovaries at the same time. In that way you insert the hand but once, and when the hand is withdrawn the muscles have divided in the direction of the fibers, and as you know the fibers overlap each other so that they take different directions. When the hand is withdrawn, the opening naturally closes, and in that way there is not really as much danger of prolapse of the bowel and not the necessity for suturing.

Dr. Williams: You suture only the skin, do you, Dr. Bemis?

Dr. Bemis: Well, I like to include the muscle also. I am not particular to suture deeply into the muscle. I also like spaying with an emasculator which has a curved edge rather than the ordinary emasculator. I find it is easier to get around the ovary and over its attachment, because it naturally follows the curve, and with the ovary in the left hand it slips away naturally over the broad ligament and it can be removed very quickly.

Dr. Warnock: Mr. Chairman and Gentlemen: I desire to congratulate Dr. Jones on the very excellent paper he has given us on oöphorectomy. I simply wish to say that having had a long experience in western Canada, having spayed many thousands at all ages during the last fifteen years, I would suggest to Dr. Jones that he try the method described by Dr. Bemis. If he does that I think he will have to do less stitching. If he separates the muscles with the fingers, all that is required is two or three stitches, just through the skin. That has been my experience for over fifteen years. I have done very many in that time and I do not think the loss, when carefully done, is more than about 1 per cent. or one in five hundred, I should say—about two in a thousand. I use a little antiseptic, just as he does, keep the instrument clean, but in my practice I am frequently called upon to spay from 200 to 350 per day, and I throw them all. They are wild; and they are laid on the right side, stretched out either with a rope on their hindlegs and on the head and foreleg, or simply by the cowboys sitting on them, one on the head and one to draw back the upper hindleg.

I congratulate Dr. Jones on his technique. It is very simple, and I have no doubt that he has had excellent results from it.

Dr. Merillat: I think it would be desirable for Dr. Jones to mention what preventive measures he takes against a subject lying down while he is operating. I have had some difficulties in this connection, and I do not believe that in his description of his technique he touched the subject of the animal scrooching down in the chute in the crucial part of the operation.

Dr. Jones: Mr. Chairman, we usually have slats passing across, just behind the forelegs and just in front of the hind ones. Now, in using the dehorning chute, as I call it, it is usually provided and arranged in that way to prevent dropping down.

While I am on the floor, I will say that in all the cattle practice I have had it seems to me that the sooner you can get your operation completed and get away from the animal without getting it mad or heated up, the more successful you will be. I have tried operating on them lying down. In that way the bowels necessarily come in contact with your hand and have to be considerably handled. By standing I do not trouble them whatever, and the animal does not become excited like it would be by throwing. I am of the firm belief, gentlemen, that if you should throw one down and get it a little excited and not operate, and then take another one on its feet and operate, the latter would not be as sore as the one you did not operate on.

As to the method of procedure, whether to make an incision through or work through the muscles with your hand, I have tried both ways. I find that the sooner I get through my operation the more satisfactory it is. Besides, in getting through the muscles I necessarily have to make a larger hole if I work through than I do if I make an incision. I want the incision to be made just as small as possible, just so as to get in, and I find it takes more time in tearing through between those muscles with my hand than it would by making my incision just large enough to slip in and then out, and close up.

About the incision, there have been times when I did not stitch anything but the skin, and the results were all right.

We have been talking about the percentage of mortality. I hardly know of a percentage to suggest. I do not believe in the sixteen years that I have been performing the operation that I know of a single fatality, and very few that I have been called back to on account of soreness or some adhesions, and in those cases of swelling we knew at the time of operating that we might expect them. Why? Because they were wild; they jumped and surged, became hot and mad. You could figure on it and count the ones that afterward gave trouble. I thank you.

Dr. Williams: Any further remarks?

Dr. Davis: I am very much interested in Dr. Jones' paper. There were a number of exceptionally good points in it. It amused me and pleased me because it was so much different from what I have been used to seeing in the way of spaying heifers. A few years ago in Wyoming seven or eight or nine thousand were spayed each year. I do not believe they will spay any more heifers in Wyoming—not that the operation was not successful but on account of the fact that they are worth so much money. Now in Wyoming most of the spaying was done by the laymen. I have seen two of them operating; they were exceptionally good operators. They were clean with the operation and very handy about it. There the calves were spayed at from five to six months of age. As a rule they were spayed for one or two reasons, to build up the herd and cut out inferior stock, or for other reasons which caused them to be spayed. As a rule the calves were corralled twenty-four hours before the time of spaying, generally in a bunch of 500. This man of whom I speak would spay on an average of thirty-five an hour. He was very fast and very clever. He had always three assistants. The cowboys would ride into the corral, three men on horseback, and they would "heel" these calves, as they term it, and stretch them out, lay them on the right side and spay through the flank. The knife used was small and razor-like with a hook on the end of it. After the hair was clipped a little disinfectant was applied, then he would make an incision through the skin with his knife, and he would just follow the muscles on down to the peritoneum and push his hand through; then the ovaries were taken and no instrument was used to remove them other than this knife, the back part of which was dull, and the attachments were scraped in removing them. In other words, it is the same principle by which a calf is castrated. The knife that is used on the scrotum is the same one that is used to remove the ovaries. After the operation, antiseptics were used. It was estimated by those men that the losses were practically about 1 per cent.

These cattle command an exceptionally good price when they go to market, later, to become feeders, but I am sure, with the high prices of cattle now, that comparatively few heifers will be spayed in Wyoming.

Dr. Williams: I would like to say that I have had experience with Illinois cattle, and thoroughly agree with Dr. Jones that they should be operated upon in a standing position. I have also had experience with cattle upon the western plains and I thoroughly agree with the Doctor here that they should be laid on the ground for the operation.

I may say that in a very large proportion of the heifers which are spayed upon the western ranges, the work is only partially done, and fragments of the ovaries remain, so that the heifers copulate and they probably are more expensive, certainly more expensive as to bull material, upon a range than an open heifer.

If there is nothing further, the discussion will be closed, and the next paper upon the program is "The Surgical Treatment of Colics," by Dr. Merillat.

THE SURGICAL TREATMENT OF COLICS IN ANIMALS

By L. A. Merillat
Chicago, Ill.

Introductory Remarks. I am using this title, for want of a better one, to present a brief review of the available forms of instrumentation useful in the management of gastric and intestinal obstructions of animals, and I trust you will not be deceived by this startling headline. "The surgical treatment of colics" might easily be mistaken for more than I shall be able to disclose as rational treatment of a surgical character for intestinal and gastric ailments. Let us therefore first announce that this epitome is not a startling proclamation about the invasion of intestinal diseases through the abdominal wall. On the contrary, like Prof. Hobday has told you, as you have been warned by Dr. Blattenberg, we are not today and probably never shall be able to invade the abdominal viscera to any great extent.

One of my objects is to draw your attention to the necessity of diagnosing abdominal diseases with more certainty at an early stage in order that we may attack them with a therapy directed precisely at the affected spot. Colic I dare say in veterinary practice is too frequently treated as such. I have often thought if the word "colic" had never entered our nosology we would then have approached abdominal pain with a more searching inquiry as to the nature or causative condition and then we would all of these years have been treating causes instead of eternally seeking medicants to cure the effect. Colic in animals has usually been considered as a mild or overwhelming abdominal pain as the case may be and too little attention has been paid to the underlying cause. Our weakest point in the management of colics is our inability to diagnose the cause and seat of the obstruction at a stage early enough to put direct, effectual treatment into operation before it is too late.

The conventional treatment of most all colics is the administration of a pain-killing potion and then if this is not followed by a cessation of the pain an evacuant is thought necessary. When these two things fail the patient dies. The pain-killing dopes are usually morphia, cannabis indica or chloral, and the evacuant anything from a violent hypodermic injection of eserine, arecoline or pilocarpine to a large drench of linseed or castor oil. And yes, when there is bloating, carminatives and antiferments are given and if the bloat is threatening a trocar and cannula are thrust into the right flank. These presents, with a few variations in the selection of drugs, constitute our standard treatment of colics today, and these treatments are so strictly conventional that almost anyone of ordinary intelligence could master the entire system after a few days of instruction. In fact, we all know of handy fellows in veterinary hospitals and large establishments who manage colics quite up to the prevailing standards.

Now gentlemen this is not as it should be at this day of sane therapeutics. We should now accept the burden of studying observations on our patients sick with abdominal diseases with a view of determining the exact nature of the condition responsible for the pain. Post-mortem after post-mortem held on animals dead from colics show too often how wide of the mark our treatment had been and how useless were our efforts to turn the tide toward a recovery if we did succeed at a late stage in discovering the cause. Very often these post-mortem investigations show that a vigorous attack at the affected spot right at the beginning might have been effective. By exclusion we do sometimes, after a patient has suffered for some time, make a correct diagnosis, but then it is usually too late to effect a cure. In short, the cases are already beyond hope and out of reach of any treatment when the diagnosis is made.

The better management of abdominal diseases must come through an intensive study of symptoms and groups of symptoms coupled with probable causes which will enable us to determine early in the march of the disease the exact seat and the exact nature of the trouble.

Abdominal Pains Misleading. Abdominal pains are, to say the least, very misleading I must admit. Even in human beings where the symptoms are subjective grave errors are often made by the treachery of pain. For example, an appendicitis patient may complain of pain in the left loin or over the solar plexus. The location of pain, in fact, gives no assurance that the lesion is at the same point. So misleading are these expressed manifestations that only the specialist seems able to properly interpret them. In animal patients we may actually be thankful to be rid of this group of subjective symptoms. In truth we are at no loss whatever in diagnosing the seat of abdominal pain for want of them. I am certain after many observations covering a good many years amongst animals sick with colics that the objective symptoms presented by animals, if properly studied and if properly grouped and then coupled with the probable cause, can be depended upon as fairly diagnostic of special conditions even at the early stage of painful abdominal diseases. And it is largely in this direction we must turn our attention if we would arrive at that "refinement of diagnosis" upon which all sound treatment must be based. In short, we are now face to face with the problem of differentiating pain in the alimentary canal within the abdomen in regard to the exact location of the cause. Pain in the stomach should be differentiated from pain in the colon and that from pain in the small bowels, etc., and that at a very early stage of the colic. With these difficulties out of the way the treatment of colics would at once be simplified into a more effectual attack of the actual trouble. And while I admit that perfection in making these differentiations need not be expected it is only by developing a more inquisitive disposition toward these phenomena that we may ever hope to become sufficiently proficient to bring our treatment of intestinal obstruction up to a worthy standard of excellence.

Inspection and Palpation. And in addition to the manifestations of pain there are other valuable recourses. Inspection of the abdomen often aids materially in arriving at positive conclusions as to the seat of the trouble, and while deep abdominal pressure depended upon so much by humans, is only of service in small animals, we have here the advantage of explorations per rectum which will yield a great wealth of diagnostic information to any one who will but practice this method of searching for abnormalities diligently. To the unskilled hand all rectal explorations, are alike, while the hand of the experienced diagnostician is capable of making wonderfully accurate deductions from them. In the earlier days of my career as a practitioner I doubted the possibility of recognizing a twisted colon, but after having read positive statements from others, expecially European writers, I began to become more inquisitive and finally discovered that torsion of the colon is not only easy to diagnose but the exact direction of the twist can be determined with precision. And so it is with many other conditions if we would only search for them more often than we are in the habit of doing. The rectal and vaginal routes offer a wide field for explorations which are fruitful or useless in accordance to the training the hand has received. The condition of the large colon, the small colon, the cecum, the inguinal rings, the kidneys, the uterus, the ovaries can be determined by them. Impactions, growths, cysts, calculi, torsions and abscesses can be diagnosed in this manner. Why then wait for the autopsy for a diagnosis with this wide-open route available during life?

Then we may take advantage of exploratory punctures and stomach catheterizations in many instances to determine more accurately the nature of alimentary disorders of an acute character.

This paper is not designed as a discourse on diagnosis, but I cannot very well introduce my subject logically without first showing the possibility of locating the seat and cause of abdominal pain with a degree of accuracy that would warrant the recommendation of treatment by instrumentation. A surgical operation is only justified when directed at a definite object, and when this object cannot be located accurately then the surgeon must leave the condition in the physician's category. On this account the following remarks deal at some length with the diagnosis of the condition the operation is intended to cure.

The Stomach. The stomach of animals is subject to the following surgical disorders which cause acute pain:

1. Overloading of the stomach of work horses, almost universally called "acute indigestion" in this country.
2. Impaction of the stomach of horses.
3. Acute gastritis of horses.
4. Acute dilatation of the stomach of horses.
5. Overloading of the rumen of all ruminants.
6. Impaction of the rumen of all ruminants.
7. Foreign bodies in the stomach of dogs and cats.
8. Foreign bodies in the rumen.

It will be noticed here that without going beyond the stomach we have already found eight definite disorders each of which I shall endeavor to show belongs to the list of surgical diseases. Some of them may yield to medical treatment and when of a mild type may still properly remain in the list of medical diseases, but when they are grave the aid of the surgeon must be enlisted or the patient will not survive. Let us analyze them separately:

1. Overloading of the Stomach of Work Horses. Acute indigestion, so-called, is so well known to all practitioners that its symptoms need no special description here. It is so characteristic and its characteristics are so well known that there is little chance to mistake it for any other disorder. Œsophageal obstruction (choke) in the very first stage and poisoning with aconite are the only two conditions for which it might by chance be mistaken and these are very easily excluded by a little study. The eructations of gas, the activity of the œsophagus in the cervical region, the distended abdomen, which may be slight or threatening, the coliky pains of a fairly acute character, occurring in a horse after a day's work, sometimes before and sometimes after having eaten the evening meal, is a clinical picture that is at once recognized as an overloaded stomach. The volume of water and feeds is too great for the exhausted stomach to handle. Gases pass readily from the stomach into the bowels and these too become bloated. In the more formidable cases large quantities of chyme are washed into the intestinal tract, until all of the bowel as far back as the floating colon is teeming with a fermenting process.

Treatment. Mild cases may take a favorable turn without any treatment and will usually respond to the administration of antiferments, of which salicylic acid, recommended by Quitman, is probably the best; but when the attack is of a severe type only radical measures taken promptly will prevent a fatal termination. The radical measures to which I refer are catheterization of the stomach and puncture of the colon if bloating is threatening. Catheterization of the stomach is practised extensively in this country, but in spite of its merits as a radical cure it has by no means been universally adopted as the standard intervention against an overloaded stomach, as it should have been long ago. Here is an operation that goes to the "fountain-head" of the trouble and without ceremony removes it from the body. To fight a stubborn fermentation in such a mass of chyme and then start the whole volume through its long course to the rectum by means of drugs seems criminal with such a splendid operation available. Those who have practised this operation have little patience with the uncertain and slow medical treatment. Stomach catheterization not only evacuates the harmful contents, but it also lowers the abdominal tension, and besides the dilution of the chyme with water controls the fermentation more effectually than any other form of antiferment treatment, and leaves what remains of the mass in a better physical condition for the intestines to handle. And often animals almost dead from acute indigestion, destined by the medical treatment to go through a prolonged agony, sometimes ending in laminitis, are cured immediately and are ready for work in a few hours.

The Sequels of Stomach Catheterization. The sudden evacuation of the overwhelmed viscera, particularly of several hours' duration, may be followed by *fatal shock* on resumption of the splanchnic circulation that had been dammed up by the pressure. It may be mild or serious according as the causes and condition of the patient chance to operate. An old subject or one systemically weak from continued hard work that has suffered two or three hours from an overloaded stomach, if suddenly relieved, will begin to show symptoms of collapse from one-half hour to six hours after the operation. The weakened viscera overcome by the prolonged stretching take more than their share of the blood volume and this at the expense of the periphery. The result is shock; but this may very frequently be prevented by injecting large volumes of hot water into the stomach after the harmful contents have been removed. The sudden relief of a badly overwhelmed abdomen is a hazard at all times when this precautionary treatment is omitted.

Laminitis is of course always liable to follow such a disorder, and while catheterization of the stomach does not always prevent it, we have found that the instillation of alum, five ounces, in solution as a parting step of the operation is markedly preventative. In our practice, stomach catheterization has even been charged with causing laminitis, but the reason we had so many cases at first is due to the fact that before we practised stomach catheterization these bad cases died before laminitis could develop. When we began to prolong the life of these otherwise fatal cases we found that some of them fell victims to this complication. Now alum has come to our rescue. Alum for laminitis was first given, to my knowledge, by Dr. Douglass, of New Orleans. Since he announced this remedy several years ago it has come into pretty general use in the West. I heard of it in California last winter, where at least one veterinarian administers it in doses of one pound. A third sequel is *acute dilatation* of the stomach, of which I shall speak later.

2. Impaction of the Stomach. Impaction of the stomach is a condition I fear veterinarians have too frequently failed to recognize. It is invariably referred to as a senile trouble in our literature and is usually attributed to chronic dilatation of the stomach in old animals fed exclusively upon a dry, fibrous forage.

While such is often the case under which the disease is encountered it is by no means limited to old animals. We have found grave impactions in young, vigorous horses with great frequency. Straw, hay, shredded fodder, coarse ensilage, alfalfa or even clover hay, partaken ravenously, is the usual cause. The cases in our urban practice are found chiefly among horses in small establishments where the food is carelessly or irradically allowed, that is, a spare ration today and a liberal one tomorrow. In short the hungry horse, after a day or two of hard work and privation, suddenly given access to a full manger, is found sick with colic the following morning or falls sick in the harness during the next day.

The symptoms of this affection are characteristic. The pains are fairly acute and as the patient finds no comfort in the recumbent position, it is continually up and down. There is always a marked perspiration about the neck and shoulders. The respirations are short and the nostrils widely dilated. Sometimes a grunt is heard in the exhalations, particularly while the patient is recumbent. The absence of abdominal distentions to account for this distressed respiration is in fact pathognomonic when coupled with the above symptoms. There may be some bloating of the right flank that becomes more pronounced as the disease progresses; but the bloating is never sufficient to account for the grave condition of the patient and only momentary relief is afforded when it is evacuated with the trocar and cannula.

Treatment. Allowed to run its course or under the medical treatment usually administered for colics, impaction of the stomach runs rapidly toward a fatal ending. Especially eserine, by further exhausting the stomach in the futile contractions to expel its contents, is always disastrous, and so with any of the powerful drugs resorted to for serious colics. Oil and purgatives afford no relief whatever.

The only remedy I have found to turn these fatal cases toward recovery is to patiently liquefy the impacted mass and endeavor to aspirate it out through the tube. The operation requires patience, as this feat cannct be immediately accomplished. The injections of two to three gallons of water into the already full stomach may actually increase the patient's agony; but after a while, when the water has had time to distribute itself through the mass, the injection of additional quantities of water will begin to bring out food particles in the reflux and finally as the softening process continues more will flow out. After patient attempt without success, a second cr third attempt may be made at intervals of an hour. As much as forty to fifty pounds of solids may thus be removed from the stomach and place an otherwise fatal case toward recovery.

Such patients are however invalids for some times and are subject to subsequent attacks of colic, probably due to chronic dilatation.

3. Acute Gastritis. Acute gastritis is the most severe as well as the most fatal of colics if not promptly recognized and relieved. It is seen under two distinct circumstances. First, after a hard day's work or long, tiresome journey, and secondly, after eating tainted food. Sometimes these causes operate together. Ground feeds containing poor qualities of corn, oats, barley and mill-feed are responsible in many cases, particularly when there is a sudden change to these feeds.

The patient is stricken on the road or soon after having reached the stable, and always before having eaten the evening meal. The patient suffers horrible agony and cannot be controlled, thrashing about in a terrifying manner. There is usually a threatening abdominal bloat that calls for immediate relief from the trocar and cannula. This operation gives only a momentary comfort. Belching is not a constant symptom, although there is generally a perceptible activity of fluids in the œsophagus. The respirations are accelerated, the nostrils dilated, the body bathed in prespiration, the temperature is already elevated to 104° or 105° and the mucous membranes are highly injected. In hot weather the body temperature is sometimes very high, as this disorder may be associated with overheating of the body.

Treatment. The pathognomonic symptom is found in the course of the treatment, which consists of the prompt washing out of the stomach with the stomach-tube and pump. The content, which usually flows out as soon as the tube reaches the cardiac orifice, is blood-stained with the exudates from the inflamed mucous membrane. It is sour and flows out in sufficient quantity to afford an immediate relief. As the tube enters the stomach the patient, until then in great agony, immediately stands quiet. The volume of solids evacuated from such a stomach is always small and can in no way account for the patient's agony. The agony is the agony of inflammation and not entirely of engorgement, as in acute indigestion. The stomach should be well washed out by alternate instillation and aspiration of hot water until the reflux is clear, and then several gallons of hot water are injected to fill the stomach against a too sudden reaction of the gastric circulation. In these cases we also use alum solution to prevent laminitis. One-half to a grain of strychnia is helpful and in twenty-four hours a small dose of oil of linseed is given to prevent the constipation that may follow two days hence.

4. ACUTE DILATATION OF THE STOMACH. Acute dilatation of the stomach is a sequel of the above disorders and is due to an exhaustion of the muscularis from the severe and especially prolonged stretching to which the stomach was subjected. In some instances the walls give way to the stretching and rupture occurs. Dilatations follow stomach colics in which there is little or no bloating in the bowels or when the bloat in the bowels is suddenly relieved by evacuation of the gases with the trocar and cannula. As long as the stomach is pressed upon by bloated bowels its walls are supported against stretching or rupture, but when bloat is absent or is relieved it distends in a backward direction and either stretches into a serious dilatation or else gives way entirely. It is, therefore, important, in treating overwhelmed stomachs, to relieve the distention by catheterization and then if necessary attend to the gases in the large bowels. To reverse these operations is a hazard.

Every bad case of acute indigestion, impaction and gastritis is followed by more or less dilatation, with which the surgeon in charge should reckon. If the vigorous subject is given prompt treatment of the proper kind, the stretched organ almost immediately resumes its normal state and is ready to functionate in the normal manner; in others the reaction requires several days and in some it runs rapidly to a fatal end or leaves the stomach a prey to frequent attacks and a victim of chronic indigestion.

In order that I may not be misunderstood, I should mention here that we use the phrase "dilatation of the stomach" to designate exclusively the stretched stomach that does not immediately contract after the material engorging it has been removed. The term is used, notably by Hutyra and Marek, as synonymous with engorgement of the stomach whether the organ is damaged by the stretching or not, while here I am restricting its meaning to the more or less permanent damage done by the stretching. That is, dilatation of the stomach is that state in which the muscularis does not contract back to a normal state when the bloat is relieved.

The symptoms of dilatation vary from a delayed return of the patient's health after an attack of colic lasting several days, in the mild case, to the gravest symptoms of fatal shock in the severe one. A bad case of dilatation of the stomach following a severe stomach colic presents all of the symptoms of a rupture of the stomach. There may be free vomition, and the peripheral coldness, cold perspiration, running down pulse rate, empty arteries, labored breathing and tremors about the shoulders and flanks combine to bring about a clinical picture that all practitioners recognize as signs of approaching death.

Treatment. The prevention of dilatations is found in the prompt relief of gastric colics by catheterization. It is also important to avoid a too sudden evacuation of colonic bloat when the stomach is overwhelmed. This is a fine point in the treatment of colics I would like to impress upon my audience. And lastly the stomach, after having been relieved of its harmful contents, should be refilled with hot water. These recommendations are particularly essential in stomach colics of old horses and in those of some hours' duration.

Weak solutions of aromatic spirits of ammonia instilled into the stomach as a parting treatment are beneficial to the weakened circulation; strychnia subdermally is helpful, and warm clothing, body frictions and sinapisms cannot be overdone.

5. OVERLOADING OF THE RUMEN. Acute bloat of ruminants is one of the commonest of strictly surgical diseases of animals. It occurs with great frequency in cattle and sheep in this country and is due usually to the rapid ingestion of gas-forming feeds, such as green clover. The hazard of turning a hungry herd into a clover pasture is well-known to all veterinarians and experienced stockmen, but green corn or any green exuberant pasture may cause it. Among city cows we find its cause is usually the ingestion of tainted feed, garbage, etc. The disorder may run

a rapid course and end fatally in a few hours, or take a less acute course and last several days when the formation of gases is not so rapid. In the most acute forms bloated carcasses of animals are sometimes found in the pasture as the first evidence of trouble and as a rule animals are dead or hopeless before a veterinarian can come to their relief.

In the acute form rumenotomy is the only practical procedure. The trocar and cannula thrust into the left flank does not always effect a satisfactory evacuation of the gases because of the semi-solid character of the contents. A large opening made with a scalpel, through and through without ceremony, is justifiable when death from asphyxiation threatens. When the immediate danger is thus despatched, then a more painstaking operation may be performed.

In the milder attacks, where the gases are separated from the solid contents, the trocar and the cannula afford a relief promptly enough.

6. Impaction of the Rumen. Impaction of the rumen is also a very common disorder in which surgery plays the most important role. It occurs both as a primary and a secondary affection. This form of stomach colic in its more formidable forms yield only to surgical treatment. Medicants are often useless. It is cured either by rumenotomy, which will be described by Dr. W. J. Martin, or else by the procedure of Imminger, which consists of the instillation of water directly into the rumen through a cannula and then aspirating out the softened contents by placing the animal on its left side with the cannula still in place. The patient is placed on an elevated platform made of two planks separated from each other just far enough so that the protruding cannula will pass between them. It reminds one of emptying a barrel through a bunghole. The liquid which runs out carries with it considerable of the solids and rids the rumen of harmful toxic products, besides softening the mass better to facilitate its onward passage through the alimentary canal. The possibilities of this operation have never been tried out to any great extent in this country, but it seems to me to be destined to become a standard operation. The softening of the contents of impacted rumens by instilling water through a cannula is not new, but the washing-out process of Imminger is, I believe, an innovation.

7. Foreign Bodies in the Stomach of Dogs. Dogs and cats, but particularly the former, often swallow indigestible objects that lodge in the stomach. Sometimes they obstruct the pylorus, or, if small enough, may pass into the intestinal tract.

While such objects sojourn in the stomach, the usual signs of colic presented by dogs are wanting; but when they obstruct the pylorus or any part of the intestines, the restlessness, howling, whining, vomiting and bulging of the abdomen indicate that a prompt intervention for removal is demanded to prevent a fatal termination.

When such obstructions are known to exist and expulsion by other means is futile, few veterinarians hesitate to effect a removal by means of a direct celio-gastrotomy. Many of these operations have been performed and nearly all of them have been successful. We have done three such operations upon dogs and all recovered. One swallowed a molar tooth of a horse, one a hairpin and the other a silver dollar.

8. Foreign Bodies in the Rumen. Bovines are the ruminants most liable to swallow bodies and that they do so with remarkable frequency is well known to all rural practitioners. The rapid ingestion of their food and the liability of their rations to contain foreign objects make the bovine species most susceptible to this accident. Nails, pieces of wire, splinters of wood, knives, screws, bolts, nuts and in fact any of the small, free objects found about stables which may accidently get into the feedbox or the manger, constitute so many varieties of objects found in the rumen. Geo. B. Jones found a cow's rumen that contained a large quantity of binder twine and from time to time we hear reports of various miscellaneous objects gaining access to it. The objects may sojourn in the rumen for months without causing any disturbance that announces their presence, but not infrequently digestive disorders are produced by them, sometimes in the form of acute colic. More often, however, when they wound the wall of the rumen or reticulum they produce a local inflammation that spreads over the peritoneum very rapidly, and by perforating the diaphragm they sometimes cause thoracic inflammations, particularly of the pericardium. There is unfortunately no pathognomonic symptom at an early stage upon which a diagnosis could be based, and on this account the surgeon seldom operates for their removal until it is too late.

Here again we have a serious condition that calls for a more careful study of symptoms in order that we may be able to diagnose the trouble at a time when surgical intervention could be depended upon to effect a prompt relief.

Impaction of the Crop of Fowls. The crop of fowls is very frequently overloaded to a serious extent, and is usually due to overfeeding of the young. The impaction may be of corn, oats, gravel, weed-seeds, peas or any of the small grains that constitute the feeds of these animals. Eaten dry, such grains may swell from their contact with the moisture of the crop and engorge it to a dangerous proportion. Young ducks are probably the most susceptible to this disorder. Whole flocks of young ducks may die over night after having partaken too freely of almost any kind of dry grains. I have found among my own animals that ducks are most difficult to raise successfully unless special precautions are constantly taken to prevent this occurrence while they are young. The symptoms are bulging of the breast, difficulty of locomotion from the sheer weight of the mass which causes them to tumble forward and then on their sides. If not relieved they are often unable to gain the upright position, and then die in a few hours from exhaustion. In older animals the disorder takes a less acute form. Chickens may live several days, dying from the inflammatory complications which intervene. The contents decompose and soon there is pressure gangrene of the walls.

In young ducks the crop may be evacuated by pressing out the contents in the forward direction, that is, the contents are pressed out through the mouth. Dr. F. H. Davis, a veterinarian of wide experience with ducks, once saved the majority of a large flock of young ducks that became stricken with this condition after having been given access to a lot of windfall berries that had been blown down from a mulberry tree. The flock was found in a serious condition almost immediately after having eaten the berries and by promptly pressing the contents out through the mouth he succeeded in saving the flock from being wiped out. Personally, I have had a similar experience with a flock of nine ducks that fell sick after having ravenously devoured a dry mash of corn and wheat bran.

In the older fowls, particularly chickens, that have suffered for some hours, it is not possible to effect an evacuation by this means, but by performing simple section of the pouch (ingluviotomy) the patients can be saved when the walls have not been too badly damaged by complications.

These operations are not trivialities by any means, and deserve to be placed among our standard surgical procedures.

The Small Intestines. The small intestines are subject to very grave conditions which cause colics, and pains located in them are the most violent of all abdominal pains, and the more anterior the trouble is located, the more intense is the pain. A diagnosis of colic in the small intestines is made by the intense agony the patient suffers and continues to suffer throughout. Whenever a horse throws itself about restlessly and violently and is beyond control, often falling to the floor with the full weight of the body time after time without a moment of relief, except possibly when it rolls into a dorsal condition against the wall, it is pretty safe to diagnose colic in the small intestines, and the antero-posterior location may be judged by the intensity of the pains. The duodeum and jejunum cause a more intense pain than the ileum, other things being equal.

The small intestines, especially of large animals, are not affected with conditions that can be successfully managed by surgery, and they are only mentioned here to carry out our plan of differentiating coliky pains. Our loss, however, in this connection is not great and should not be discouraging, because bowel surgery fcr intrinsic conditions is pretty hopeless anywhere. Even the human surgeon despairs at the necessity of cutting into the intestinal tract, and if we are denied the benefit of such interventions we are not denied much that is successful. I know that surgical literature records enterotomies, enterectomies and approximations with a recklessness that would lead a reader to believe that these are but commonplace, every-day trivialities, but when one scans statistics of mortalities and untoward sequelæ, we veterinarians may be thankful that our animal patients are not suitable subjects for such operations.

The diseases of the small intestines found in domestic animals with sufficient frequency to be called common diseases are:

1. *Enteritis.* Enteritis may be local from a local obstruction, but more often it affects a more extensive area. The whole tract, including the stomach and large intestines, may be affected. It probably always has its origin in faulty alimentation, but early in the course of the pain bacteria play the important role and thus produce a condition that no surgical operation could benefit.

2. *Obstruction.* Obstipations from fibrous forage or unnatural food may cause obstruction at one point or over a considerable portion of the small bowels. Circumscribed obstructions may cause pouching of the gut at the point affected and thus leave a place for future accumulations. In dogs, clay, sand, or foreign bodies may lodge in them and in ruminants foreign bodies may pass the four stomachs and lodge at or behind the pylorus. Here again, we cannot successfully operate for them even if we should eventually succeed in diagnosing these cases.

3. *Volvulus and invaginations* are common enough to warrant a very close study of the early symptoms. And it is a pity we do not diagnose them early, because here we have conditions which could be relieved by extrinsic manipulations and would, therefore, be less hazardous than operation requiring invasion of the rumen. I regret to say that I have never been able to find these conditions except at the post-mortem examination.

THE LARGE INTESTINES. Pain in the large bowels is easy to differentiate from pain in the stomach or small intestines. It is always of a milder type and often intermittent and may last for days. In practically all of the autopsies I have had the opportunity to hold on animals dead after long sieges of colic, the incriminating lesion was found in the large bowel. The pain may be acute in the early stage, but this soon gives way to one that is milder and lasting. Sitting upon the haunches, dog-like, points to trouble in the large bowel. The common sign of turning the nose toward the flank is also one that is seen more often in disorders of the large bowels than of the small ones, although too much dependence must not be placed upon this symptom because the same manifestation is seen in almost any form of colic. The act of holding the nose at the flank for some moments at a time is, however, a certain indication of a grave condition like a strangulated hernia, volvulus, invagination or fatal local obstruction of some other character. In stomach colics there is always the tell-tale dilatation of the nostrils and local sweating about the foreparts of the body, while in colon disorders these symptoms are wanting after the bloating has been relieved. These rules of course apply only to the early stages of the affection. An impaction at the sternal flexure may give rise to these stomach symptoms, but the differentiation is soon made when stomach catheterization fails to afford relief, and then there is always the rectal exploration upon which we can depend to make an accurate diagnosis of the exact seat of the obstructions in all instances.

The disorders of the large bowels in which surgery plays an important role are:

1. *Acute Intestinal Indigestion.* This is sometimes, although by no means always, associated with acute indigestion in the stomach. In this condition, which is flatulent colic of the old-school veterinarians, the bowels are overwhelmed with food or with tainted food. The formation of gases from fermentation is sometimes so rapid as to cause death in short order if relief is not promptly given, and often the damage done to intestinal walls by the stretching produces a condition in the colon analogous to the dilatation of the stomach previously described. The exhausted muscularis, being unable to contract, fails to move the accumulated mass. Very often, I regret to say, this state of exhaustion is aggravated if not actually caused by the administration of eserine or arecoline. These drugs tax the muscularis severely by causing futile contractions against the solid contents and thus leave the bowels helpless, vapid, paralyzed at a crucial period of the disease when a little peristalsis would be mighty precious.

Treatment. The simple operation of intestinal puncture, enterocentesis, as we have been prone to call it, is the cherished bit of colic surgery that must be depended upon as the curative expedient. It is strictly a veterinarian's operation, very old and very simple, but no less valuable because of this. The value of horses saved by this simple operation would be well worth recording. When this operation has been done appropriate medical treatment per os must follow. Analgesics? No. Cannabis indica, chloral, opiates are so many harmful agents that should have no place in the treatment of this condition, or in fact any form of colic for that matter. I have during the last few years followed with wonderful success the treatment of the late Dr. N. P. Whitemore, of Illinois, which consists of the administration of ether in large doses. Whitemore would administer to his patients sick with acute indigestion, gastric or intestinal, a full half-pint of ether as a drench. I have been told on good authority that he sometimes drenched a horse with one-half pint and even a full pint of ether from the original package without dilution. This we have modified to six ounces given with linseed oil. The effect of ether vapor upon intestinal fermentation is phenomenal when given in large doses. A purgative of aloin or aloes given as soon as the acute symptoms have passed will act as a stimulant to the colon some hours later, at a time such stimulation is needed to prevent obstipation.

Impaction of the Colon. The second disorder of the large bowels is impaction of the colon, a condition consisting of the accumulation of more or less solid masses of aliment throughout or at different points of this large folded compartment. It may follow acute intestinal indigestion or may arrive as an initial condition. Where horses are fed largely upon dry fodder for months it is very common, and horses worked hard and fed well to keep up their condition are also very susceptible. In hard-worked city horses it often follows periods of idleness where the ration is not reduced, and horses idle from some locomotory disability may fall victims while unable to take sufficient exercise to keep up the intestinal activity.

Pathologically impaction of the colon as seen in horses is a partial or complete paralysis of the walls of the colon. The word "paralysis" applies best to this condition, because the muscularis after being overwhelmed into a state of enfeeblement fails to contract.

The symptoms are quite characteristic. Indeed there is little excuse for not making an early diagnosis in every case. The pain is mild and at first intermittent. The right flank, compared carefully with the left, is slightly bulged and sometimes bloated. During the first hour or two feces are voided frequently in small quantities, but this ceases as soon as the floating colon is empty. On auscultation of the right flank the borborygmus is found feeble or absent, and on exploration per rectum there is little trouble found in locating the solid contents of the colon. When the pain is more acute the patient may sit dog-fashioned or at times stretch out as a male does in the act of urination. The absorption of toxic products may cause some elevation of temperature in rare cases early in the course of the disease, but more often there is but little rise in the body temperature until the patient is in a hopeless condition. I would always interpret fever with colonic impactions as an exceedingly grave symptom.

Treatment. When impaction of the colon is found to exist, no time must be lost in waiting for the action of slow-acting purges, and powerful drugs acting as transient stimulants to the muscularis are exceedingly harmful. A horse affected with a formidable impaction of the colon that survives a dose of eserine survives in spite of the treatment and not through it.

Linseed oil and also aloes are probably the best drugs for this condition, but are useless in serious cases because there are no contractions of the muscularis to distribute it to and through the accumulated mass, and as for eserine I am certain it is only helpful in cases which would have recovered without medication. The walls are too weak to cope with the heavy, dry, voluminous mass impacted within them, and a transient stimulation, such as is produced by eserine, only adds to the enfeeblement by impelling futile contractions.

We are now using for this condition three forms of direct treatment:

1. Colonic Flushings per Rectum—High Enemas: While we have not entirely overcome the difficulties attending attempts to wash out the large colon of horses, we are becoming more and more successful in injecting large volumes of water into it. We admit there is no easy method of washing out the colon. The long floating colon of the herbivorous animals stands as a real obstacle against the instillation of water into the larger compartment anterior to it; but since the veterinarian is thus deprived of a mighty effectual curative expedient, any manipulation that would surmount this obstacle would be an invaluable addition to the treatment of many grave disorders. We need colonic flushing in animal therapy and we need it badly. Fatalities among animals sick with digestive disorders would be greatly reduced if we could inject water into the colon of herbivora as easily as in that of the carnivora and of humans. Curing impactions of the colon would then be a triviality.

Our method of forcing water into the colon is not perfect. We are still in need of a better instrument to prevent reflux from straining, but we have shown to our entire satisfaction that by patiently forcing water at a temperature of 112° F. into the floating colon by means of a hose and pump, with the rectum packed with substances to prevent free reflux of the water, large quantities can be passed into the colon. While the floating colon is still full of feces not much headway can be made, but when these are expelled a stream may be made to flow forward through this gut into the large colon. Straining to expel the water injected cannot be entirely controlled, but we have found that since all of the water injected is not successfully expelled by the patient in these seizures, some will find its way into the colon if the operation is persistently continued. We have found also that an animal narcotized with drugs administered hyperdermically or anesthetized with chloroform will take large volumes of water by a little patient forcing, and also that water at the proper temperature, not too hot or not too cold, is less apt to cause straining. We once ruptured a horse's floating colon by applying too much force to the pump, which fact shows that the operation is not without its hazard.

Our method in use today, but which we hope to improve when we have finally invented the proper instrument, is as follows:

A hose is passed into the floating colon as far as possible and then the rectum is packed with cotton wads until it is full. Expulsion of the cotton is prevented by holding the hand firmly against it within the anus. Then hot water previously prepared in abundance is pumped into the hose until straining is produced. As soon as the straining paroxysm ceases the pumping is resumed. At first only a small quantity may be retained, but if the operation is persistently repeated large quantities will eventually find its way forward. The operation is a mussy affair, I admit, but it is none the less valuable on this account. The Kellogg syringe, which contains an inflatable rubber bulb to prevent reflux, is probably an improvement over this more crude mechanism of ours, but it too must be held in with the hands and the reflux is by no means controlled by it. There is need of a hose having an inflatable bulb as large as a football so arranged that it can be retained in the rectum by means of a harness. We are now having such an affair constructed, but since it has never been completed we cannot of course venture any opinion as to its merits at this time.

2. Instillation of Water into the Stomach: The second operation we use against impactions of the colon is the instillation of copious drafts of water into the intestines through the stomach with the stomach tube. If the stomach is full, but this is seldom the case, it should first be washed out and then six to eight gallons of water injected into it. The water promptly finds its way into the intestinal tract, sometimes as far as the cecum. By supplying the intestines with these liberal draughts of water from two directions there are indeed few cases of impactions that will not yield when the diagnosis is made before the muscularis has been too seriously weakened and a peritonitis has already developed.

3. Flushing the Colon Through the Abdominal Wall: The third is the direct instillation of water or oil into the colon through

the abdominal wall by means of a trocar and cannula. The right flank is punctured in the usual manner, and after the trocar is removed a small rubber hose is attached to the cannula and the instillation done by pouring the liquid into a funnel attached to the other end. The intestines will slowly take liberal amounts of fluids in this manner. The procedure is harmless and if done at an early stage is very effectual.

When the contents are known to have been softened by these methods, eserine may be given with safety and with splendid results.

I am aware these symptoms of attacking impactions are not new. They have, however, never become standard operations, and in view of the fact that they are proving phenomenal in the hands of those who have become expert in the essential manipulations, this attention to them has been deemed worth while.

4. Torsion of the Colon: Torsion of the colon is a common enough accident of horses and of course is always fatal. Attempts to correct this misplacement by manipulations have never been successful. Some have told that this may be done by rolling the patient while the arm is held in the rectum. At my hands this has always failed. Direct handling of the organ through a flank laparotomy has likewise been an unsuccessful procedure with me. I have always found the colon too weak to stand the traction required to lift it with its heavy contents. Latterly the procedure of Hartwig, of Wisconsin, for torsion of the uterus of cows, has occurred to me to be applicable to the colon as well. I have, unfortunately, not met a case since Hartwig announced his method publicly, but believe we now have a method of untwisting a colon without much trouble. The success of course will depend upon a diagnosis made before the organ is damaged by disease.

Hartwig has performed some operations for torsion of the uterus in cows with splendid success by making an abdominal section in the right flank large enough to admit both arms. In this I see the secret of success in handling the twisted colon, for with both hands the organ can be lifted without danger of tearing its walls.

In conclusion I venture to say that the possibilities of successful instrumentation of the intestinal tract and stomach of animals are by no means meager. Although the operations are of a different order than those splendid invasions of the human surgeons, we have a broad field which we have thus far failed to cultivate as fruitfully as is possible, and from which may be selected a wealth of operations that cure colics heretofore mortal in their character.

DISCUSSION

Dr. Williams: Gentlemen, the paper is now open for discussion and our time for adjournment is drawing very near. If we discuss it at all freely it will take up the entire time, and I understand that there is to be one other number upon this program. Are there any remarks to be made upon Dr. Merillat's paper, or any questions to be asked Please be prompt about it as the discussion will need to be closed very soon.

Dr. Berns: There is just one thing I would like to say, Mr. Chairman. I have not been particularly partial to the use of the stomach pump. We have not used it to any great extent; but from what I have heard today I am going to use it very often.

Dr. Williams: We would be pleased to hear from other practitioners upon this question.

Dr. Berns: There are a number of gentlemen in the immediate vicinity here who desire to know how Prof. Merillat uses it, whether he introduces it through the nostril or the mouth. Just a little light on that subject will please a good many of us.

Dr. Merillat: Well, we have no special choice. Some of our men like the mouth, and others the nose, but I believe today they are taking the nasal route as their preference. The objection to the mouth route is that the horse does not take the operation quite as gracefully as through the nose. In the nasal route, the patient objects less to the tube while it is passing down the chamber. In the mouth there is a constant fight against the speculum.

Dr. Williams: With a little cocaine, could you overcome the objection?

Dr. Merillat: I believe you could. I think you would get splendid results with it. Our method today that seems to be giving the best results is the use of the ordinary tube with the stilette. We have assistants who are most expert in the use of the tube, men who can slip the tube down with great facility. They use a stilette and an ordinary rubber stomach tube, greasing the stilette well with vaseline before it is put into the tube, and then without ceremony they push it right through the nostril and into the stomach. We never look, as we used to do, for the horse to swallow. We seldom make a miss, because with the stilette in the tube it always goes in, whereas if the tube is limber it sometimes drops too low while passing the pharynx and goes into the trachea. The stilette is put into the tube to within one inch of the end. This gives a little flexible end. It must not go within two inches, because the tube might fold over at the end of the stilette; but by being about one inch from the end there is always a soft, pliable end which contracts the tissue, and there is never any tendency of its bending so as to shut it off. Then after the tube has reached the stomach, the stilette is pulled out.

Now, it is a little difficult to pull a stilette out of a tube. It sometimes requires the strength of two men to pull it out; one man holds the rubber very firmly and two men grasp the stilette, and it will thus finally slip out. Never make the mistake of not greasing the stilette well. You can easily understand, with a tube that is curved in two directions, the difficulty in pulling out a stilette. In this manner there is never any danger of passing it into the lungs, and you can always cause it to enter the stomach. A flexible tube does not always go into the stomach. When a horse is sick there seems, sometimes, to be contractions about the front of the stomach that put up a really formidable block against the entrance of the tube into it, but with this forcing method it always goes right into the stomach.

Now, another little secret about stomach catheterization is in determining just when the end of the tube is in the right position. Sometimes it is too far; it may curl up in the stomach in a poor position for aspiration; at other times probably it is not in far enough. It is well to study carefully by alternate injections and aspirations until you seem to get the best results. When the water goes in freely and flows out freely, then you can begin pumping and churning as much as you desire.

I believe that is about all I can say about the technique. We use most any kind of a tube; we do not use a double tube; we have never found them of any special advantage.

Dr. H. Jensen: In case of colic, where you have gas in the stomach, without using your stomach pump, did you ever use bicarbonate of sodium or chloride of sodium, ordinary salt?

Dr. Merillat: Well, I have heard of about all the colic medicines that ever were mentioned, and I guess that is one of them.

Dr. H. Jensen: Try it some time.

Dr. Merillat: I never have used salt.

Dr. H. Jensen: I have, without the tube.

Dr. Merillat: The position taken in regard to these recommendations is this (I believe I made it plain twice in the paper): that ordinary colic is one thing and a serious colic another. The kind which is fatal under medical treatment is the kind that requires the services of a surgeon. The ordinary case of colic does not require much care. I had charge of a very large hospital once when I was growing up as a young fellow, and in the summer time, I can remember, there were always from five to six colicky cases in the colic room at a time. They were rolling over each other, and during that time I studied colics a great deal, and I came to the conclusion after a wide experience that the cases that I did not meddle with often made the best recoveries. I was often surprised to find how serious cases made splendid recoveries without the intervention of medicine, when I did not have time to give them all a dose. Colics have a way of taking care of themselves if we do not meddle with them with drugs that prevent a spontaneous recovery. If you will learn to take advantage of the natural tendency of an ordinary colic case to recover spontaneously, you will take advantage of the greatest factor in their cure. But here and there we diagnose conditions that are very formidable, *e. g.*, an overwhelmed stomach that cannot be relieved by vomition and that is going to be damaged before it can be relieved and evacuated through the usual channel. In such cases the surgeon by instrumentation affords the relief to patients otherwise mortally stricken. Sometimes, as I have tried to show under the head of acute dilatation of the stomach, the damage is already so great when the surgeon arrives that there is no reaction toward a cure, after everything is removed, and then the patient in spite of everthing dies. However, very often by making an early diagnosis of the serious conditions, and putting into operation the proper remedy, we are able to cure the cases which die under medical treatment.

I have spoken here of the laminitis feature. In a very large establishment we had two very bad cases of laminitis after this instrumentation, and the owners of that establishment accused the stomach tube of causing the trouble. I went before them and showed them that it was not the stomach tube, that these animals would not have lived to have been stricken with laminitis if we had not used the stomach tube; they were badly stricken horses, and would have died in a few hours, but by the use of the stomach tube their lives were prolonged and laminitis supervened. This explains the laminitis that follows the use of the stomach tube. I expected that to be raised against this operation.

Dr. Harper: I have found if you will just wet your tube and use some ordinary slippery elm bark you will pass your tube very easily. Just as you get it into the throat, watch your horse, and when he swallows, pass it, and it is all done.

Now, with regard to bleeding from the nose, very many times you will find that when you go to remove your tube there is a little adhesion. Now if you will just turn your tube a little one way or the other, the membrane will let go of it and you can pull the tube out. If you take hold of the tube and pull it out suddenly you often get a hemorrhage.

Dr. Roule: We have a condition in the southern states that has not been touched upon, that is caused by the clover ball. An accumulation seems to take place and it remains in the intestines for a great length of time. One case that came under my observation was that of a horse which had been fed on Italian clover from the beginning of June until the latter part of July. Then the supply was exhausted and the horse was sold at a public sale in September. In the middle of December this animal died from a severe attack of colicky pain, and upon post-mortem it was found that he had a clover ball about 4½ inches in diameter, that had evidently been in the intestinal tract all that length of time. You have seen the clover, I suppose.

Dr. Merillat: My paper deals with those conditions. I did not read all of the paper, but it will all be published.

Dr. Roule: I am sorry you could not afford us some relief.

Dr. Chase: There is one condition that I am sorry Dr. Merillat did not touch upon, and that is the passage of the gall-stones. I wish that he would enlighten us by his vast experience as to the best mode of treatment in such cases of gall-stone colic.

Dr. Merillat: I never saw any gall-stone colics, Doctor. I regret very much that I cannot give you any information.

Dr. Williams: Is there any further discussion? The time is slipping away very rapidly.

Dr. Berns: There is another phase of this condition that Dr. Merillat has failed to mention, and that is rupture of the diaphragm, which occurs once in a while ante-mortem. I will relate to you a case which occurred in my practice a good many years ago. A horse came in suffering from colic from all appearances and symptoms, scratching with his front leg, extending his hind ones, and the other usual symptoms. He was placed under the ordinary treatment and the result was he got well. In two or three weeks he was found in the same condition, and the ordinary antispasmodic treatment relieved him. He came back a third time. This time I advised the owner to dispose of him, and the result was that this horse was sold at auction. Six weeks later we were called upon to see the same identical horse again, belonging to another gentleman. This time he did not get well; he died. A post-mortem examination revealed a slit in the diaphragm, a healed slit in the diaphragm. The slit was probably four or five inches in length, and the edges were rounded off nicely and smoothly, indicating that the slit had existed, to my knowledge, all of two months.

Dr. Merillat: Was there strangulation at the time?

Dr. Berns: There was, yes.

Dr. Merillat: The paper covers only those forms of colics which yield in a measure to instrumentation. Rupture of the diaphragm is not one of them.

Some of these conditions are mentioned in my paper, but I did not read them. I did not have time to mention a number of diseases of the small intestines due to local obstructions.

Now we have clay obstructions in dogs that are met with great frequency. I had occasion one time to perform an operation on a dog, but I never finished it. Eighteen inches of the ileum was practically clay-choked.

These are all mentioned in the paper, but of course the time prevented me from reading them.

Dr. Williams: Well, gentlemen, unless there are some further important questions to be asked or remarks to be made, I will ask that the discussion be closed.

There was to be a paper presented upon neurotomy. The gentleman is absent, and I understand that Dr. Berns has agreed to offer a few remarks upon the subject of neurotomy. As the time for adjournment is now very near I shall have to ask Dr. Berns to make those remarks quite brief.

Dr. Berns: I am not prepared, Mr. President, to say anything upon the subject of neurotomy. The request was made of me at the eleventh hour.

Dr. Merillat: You promised us yesterday.

Dr. Berns: No; I reserved my decision. I should prefer not to say anything upon the subject at this meeting. We will take it up at some future meeting.

Dr. Merillat: All right; we will excuse you.

Dr. Williams: Then, gentlemen, shall we continue the discussion of Dr. Merillat's paper for a few minutes? Is there anything to be said further upon Dr. Merillat's paper?

A Voice: I would like to know what experience he has had in inserting the tube with the horse lying down?

Dr. Merillat: When the horse is very sick the operation offers some little difficulty. Our practice is to put a horse into a single stall and put a very strong halter on, strong enough to hold up his head, and then just push the tube down whether the horse is down or up. The head is held up by the halter. As a general rule in these cases when the stomach is reached there is some relief felt and the patient stands up and thereafter is pretty quiet. If one is operating out-of-doors, there would be real difficulty in passing the tube. You could hold a horse down, however, and tie his legs.

Dr. Williams: If there are no further remarks, and no further business to come before this section, the section stands adjourned.

Thursday Morning, September 4, 1913

The Section on Surgery participated in the Symposium of Section on Sanitary Science and Police.

Friday Morning, September 5, 1913

Dr. John W. Adams, Presiding

Dr. Adams: Will the meeting come to order, please?

The first thing on the program is "A Contribution to the Etiology of Roaring," by Dr. E. Merillat, late Professor of Comparative Physiology in the Chicago School.

Dr. Merillat has a severe cold and cannot be heard very well; so I am going to ask somebody else to read the paper. Dr. Webb is looking over the paper, and in a moment I will ask him to read it.

Just in this connection I cannot say that I am prepared to discuss the etiology of roaring, but while he is familiarizing himself with this paper which he has never seen before, I will mention the fact that a number of years ago someone who was called a qualified man, made a section of those motor nerves to the muscles that were found paralyzed in roaring —that is, the posterior crico-arytenoid and the thyro-arytenoid muscle and he found that there were signs of nerve degeneration from the termination of these nerves in the muscles centrally, for a distance, as I remember, of seven and a half inches in one case. In all cases it seemed to this particular investigator that the nerve degeneration was entirely peripheral and extended but a few inches—as I say, seven and a half inches in one case—from the termination of the left recurrent laryngeal nerve, and that other portions of the nerve seemed to be healthy. In no case were there any signs or evidence that enlargement of the bronchial glands, or previous inflammation of the serous membrane of the thorax, had anything to do with the inhibition of the motor impulses to the muscle. It seemed to be entirely a peripheral affair.

As I say, I am not prepared to discuss the etiology, and therefore I cannot even give you the name or names of those making the investigations, but I say this just to fill up the time. We will now listen to the paper on the etiology of roaring.

A CONTRIBUTION TO THE ETIOLOGY OF ROARING

By L. A. Merillat and E. Merillat
Chicago, Ill.

The pathological state in which we find the larynx of horses affected with this condition—the muscular atrophy and the concomitant results—has occupied our attention more than the incriminated lesion to the nerve away down in the thorax. We have studied only that phase of laryngeal hemiplegia to which the surgical treatment is directed and have neglected to seek diligently into the more remote lesions which would complete an anatomo-pathological study of the affliction. The treatment of roaring has occupied our attention intentively for years and whole volumes have been written about the various operations which have from time to time been introduced as cures, but our literature lacks a detailed study of its etiology.

The unsymmetrical arrangement of the two recurrent laryngeal nerves in the thorax is the anatomical feature upon which the attention may be directed whenever an attempt is made to explain the frequency with which the disease attacks one side and so rarely the other, but the character of the damage the left nerve suffers must first be studied before any proof can be shown to corroborate the suspicion of nervous injury within the thorax. To establish a tangible explanation, a careful anatomical and histological study of some roarers dead from some other disease has been made, with the conclusion that there is always ample evidence in roarers of damage to the left nerve in the region of the heart. Searched for carefully, the lesion can in some cases be pointed out macroscopically in the form of firm adhesions of the nerve to pleura or pericardium or both, and from which it can be dissected with the greatest difficulty. Dissected from these unnatural attachments from the aorta through the mediastinal glands to the level of the first rib the trunk is found hard and cordiform, as if attacked with an interstitial neuritis of long standing.

When these conditions are found the investigator need go no farther in search of the incriminating lesion, for these are surely sufficient to account for all of the other characteristics of the disease—the atrophy, etc. The reason for its disposition to affect the left side is easily explained, in the fact that this trunk having such extensive thoracic relations falls prey to the toxins of thoracic inflammations, while the right nerve leaving the parent trunk near the first rib escapes them. In observations made on fifty-six dissecting subjects the right nerve was found entirely extra-thoracic in twelve cases and in only a few was it found to enter very deeply into the thoracic cage. In two cases it—the right nerve—was found well descended, leaving the vagus trunk just in front of the aorta. Thus the occasional "right-roarer" may be accounted for.

There are, however, many roarers in which these gross pathological conditions cannot be so easily pointed out, yet none thus far investigated in which a microscopic examination of sections was made from the trunk failed to reveal degenerative changes.

The primary disease responsible for these nervous lesions, in this country at least, is bronchopneumonia, which in its more serious form is always more or less complicated with pleurisy and pericarditis. Plain uncomplicated croupus pneumonia seldom causes roaring as a sequel, no matter how seriously ill the patient may have been by reason of an extensive involvement of lung tissue, but the pneumonia coming as a complication of influenza, ship fever or catarrhal fever, all of which are probably the same condition under different names, is very prone to end by leaving the patient more or less afflicted with a laryngeal insufficiency.

Horse distemper, or strangles, given as the chief cause of roaring by almost all European writers, cannot be said to be the principal cause in America. Not that strangles does not cause roaring in this country, for it surely does; but the statement of Hobday, for example, that the elimination of strangles would practically eliminate roaring would not apply in this country, because we would still have as a very frequent cause the shipping fevers so prevalent throughout the Western Hemisphere.

In this country distemper, or strangles, is a cause of roaring when it takes the "irregular" form, *i. e.*, when it does not run to a favorable termination after suppuration of the lymph glands of the head—the submaxillaries, the retropharyngeals and superior cervicals. Whenever these glands alone are affected, no matter how ill the patient may have been from the toxemia and the serious dyspnea and dysphagia, roaring will follow. The statements that the changes in the larynx may occur from local inflammations within and around it is not based upon facts, as such inflammations could not select out a single half of the larynx, with its uniform line of demarcation between normal and atrophied muscular tissue, as is seen in all cases of roaring.

It is the strangles that tumefies the lymph glands about the head without bringing them rapidly into the state of suppuration, and then extends into the glands of the chest, that leaves the convalescent a roarer. In this instance the very close relations of the mediastinal and bronchial glands to the left nerve is ample explanation of the manner in which this disease can reflect upon the integrity of the laryngeal nerve and cause the very same lesions found after pleuritic and pericardial inflammations. From all of our investigations we conclude that roaring following disease is due to a *toxic interstitial neuritis.*

But aside from these there are roarers which have never been afflicted with any serious febrile disease and which on examination of the larynx during operations or at autopsies are found to be affected with true and typical laryngeal hemiplegia. How are these to be explained? The running horse, the trotter, the pacer, the cavalry horse, the hunter, the polo pony, air-line express horse and even the heavy-draft horse very frequently after years of good health and splendid service gradually develop laryngeal hemiplegia. Sometimes the development into a formidable affliction is fairly rapid, more often, however, it is gradual. Kept at the same kind of work without any palliative treatment the condition progresses more and more into a hopeless state of serious dyspnea. These cases on operation or autopsy prove to be afflicted with the typical conditions and yield as nicely to operative measures as those due to disease of the thoracic organs.

The opportunity to make a careful study of such a case postmortem came to us during last winter and it is the findings of this case that prompted the writing of this contribution. The patient was a draft horse, twelve years old, weighing 1500 pounds, that had been working in a teaming establishment continually for seven years. The patient was one of a three-horse team engaged in hauling very heavy loads of six to eight tons and sometimes more. He was of the ambitious sort, having earned the reputation of being an exceptionally good puller in a pinch. During the fall of 1912 he began to show some distress in breathing under severe exertion and the condition became gradually more grave until the middle of the winter when, being perfectly useless, he was submitted for operation.

The operation was performed in the usual manner and the findings typical. The left side of the larynx, judged from the immovable arytenoid, was completely paralyzed. The patient was carelessly allowed to die from dyspnea during the second night after the operation.

A very careful examination was made of the thorax on the following morning. The right nerve was given off the vagus opposite the second rib and the left at the usual place just behind the aorta. The left ventricle was dilated but not seriously and there was no evidence of valvular insufficiency. The aorta was normal in size but was carried slightly outward by the dilatation. The nerve was carefully examined before its relations, the aorta, trachea, glands and esophagus were disturbed, and here already the explanation was apparent. Instead of being connected to its relations about the aorta by the usual areolar tissue, it was a glistening, loose, free drawn-out cord playing around the aorta like a rope over a pulley. The aorta showed the effect of the rubbing by a smooth surface, one quarter inch wide and one and a half inches around the circumference of its base. Further along the trachea, in the forward direction, the nerve was not loose but attached in the usual manner to the pleura and lymph glands. The suspected part of nerve, a piece higher up, and a piece of the right nerve were removed for comparative study. The suspected piece was visibly smaller than the others, as if degenerated or stretched out, and when appropriately prepared and mounted no axis-cylinder could be found in the sections. Everything seemed to be crowded out by the connective elements. Sections made from the nerve higher up showed all of the characters of normal nervous tissue and the right nerve was also sound. From these findings it is very evident that the impulses in this roarer were interrupted at that point of the nerve trunk where it contacts the aorta.

Similar conditions have been observed before in crudely performed autopsies, but never before had we placed a carcass in a proper convenient position to make a careful analysis of every phase of the condition. Autopsies designed to make such investigations must be performed with great care, with the carcass in the upright attitude, hung from the nape of the neck and croup, so that the region of the heart may be approached with all of the organs in the natural position. Then by carrying out a careful dissection it will not require the assistance of the microscope to discover that the nerve at the point of its aortic relation is in a state of atrophy. We have frequently observed this in cursory autopsies with the carcass recumbent.

Our conclusions in regard to this class of roarers is that the cause is *pressure atrophy*—a parenchymatous atrophy—due to the constant pressure of violent cardiac and aortic movements which crowd the nerve at each heart-beat against the hard wall of the trachea. The violent movements of the heart and the friction upon the nerve by the trachea are undoubtedly the exciting causes.

There is still another class of roarers to be accounted for to which the above findings do not apply and that is the class of aged roarers, by which we mean to designate those aged animals which develop the condition during their declining years. These cases are often found to be affected with a bilateral laryngeal paralysis due to senile atrophy of the nerve trunks. The loss of the myelin sheaths and axis-cylinders in the nerve trunks of such subjects is easily demonstrated. The fact that other nerve trunks of the internal organs are also found deficient in aged animals may make our conclusions seem arbitrary, but when one takes into account the observable results of laryngeal insufficiency as against the obscure effect of nervous insufficiency of other organs it is plain enough that senile atrophy is a reasonable explanation of senile roaring.

Our findings are as follows: (1) Roaring due to disease is caused by toxic interstitial neuritis of the left recurrent (rarely the right) at some point within the thorax, usually along the chain of lymphatic glands; (2) roaring developing from severe exertion is due to pressure atrophy of the left nerve where it winds around the aorta and is compressed by the trachea; (3) roaring of old age is due to senile atrophy of both recurrent nerves; (4) right roarers are rare because the right nerve is so largely extra-thoracic.

Dr. Adams: Gentlemen, you have heard this paper. I would like to hear from anyone who has anything to add to the subject of etiology of roaring, or who has had any peculiar experience that might seem to suggest a causative agent in the production of any of these forms of roaring.

I might say that in the 70's and 80's, when Fleming and Moller were particularly interested in this subject of roaring, its cause and treatment, a great deal of work was done upon the left recurrent nerve in its passage through the thorax to determine whether histological changes could be found in the nerve. The general consensus of opinion at that time was that the nerve, as a rule, showed no evidence of disease. But may it not be that histological technique was not sufficiently advanced in those days to detect interstitial neuritis, for instance?

I am inclined to the belief, myself, that the reason the left side is so much more affected than the right must be due to the fact that the left has an altogether different course from the right, and that therefore it must be subject to some influence in that region where it takes a different course from the right nerve. It seems perfectly logical to me that we should look for the insults to the left nerve within the thorax; and I believe, with Dr. Merillat, that it is quite probable that in chronic interstitial neuritis—*i. e.*, a proliferation with thickening of the neural lamina, the perineurium—the thickening and contraction so compress the sheath that the impulse is largely or completely cut off.

I would like a physiologist to tell me—between a motor nerve a foot long and a motor nerve three feet long—which under the same amount of stimulation should first fail to cause muscular reaction. Now, as there is a great difference in length of the right and left recurrent laryngeal nerves—one a long, thin nerve and the other comparatively short (neither nerve is exposed to insult along its course)—which nerve under the same amount of stimulation would first fail to cause muscular contraction? I am not enough of a physiologist to know? That occurred to me and I wondered if there was anything in it. Is there a point beyond which stimulation at one end will not cause muscular contraction in the other? Has anyone had any experience, for instance, of strangles in colts causing this trouble? I thought for a while that post-pharyngeal and subparotid abscesses were a frequent cause of roaring in colts. I did not like to see a big pus cavity alongside of or just behind the larynx. It has been my practice when swellings have arisen in that region, in colts, to open them early, even before I felt that I would get pus, so that when pus did form it might flow out of the artificial opening that I had made, even though I did not tap the pus cavity. I still believe that is good practice, but I do not know whether it tends to prevent nerve degeneration in this region or not.

Those who were to discuss the paper are Doctors W. L. Williams, J. H. Blattenberg, J. W. Klotz, J. Victor La Croix and others. Dr. Williams is engaged at present. Is Dr. Blattenberg here?

Dr. Merillat: Dr. Adams, the intention was to have a discussion with special reference to the untoward sequelæ and methods of preventing them with the view of determining what is best to be done to make the operation a better one than it now is.

Dr. Adams: Well, then, Dr. Blattenberg, will you speak along that line. Can you suggest any changes in our present operation which will make it a little more safe, for instance, or a little more efficient? Has anything occurred to you that might seem to point in this particular direction?

Dr. Blattenberg: The only suggestion I would make would be, that the cleaner the removal of that mucosa the better, without touching anything else, without even touching the cartilage at all, without any irritation to the vocal cord, and yet as clean-cut and as close to the margin as possible, without any interference whatever to any part of the larynx outside of that which you expect to remove.

I might relate one of my experiences; it has nothing in particular to do with this, but I am reminded of the story: A man came to me who had a jackass that was regarded in the community as exceedingly obnoxious; he was condemned for the noise that he made. From a study of the subject of roaring I thought that by altering the larynx I could make a whispering jackass out of it for the sake of the community. I consulted a specialist on the larynx, a man who has been abroad several times, and who does very intelligent work on throat trouble, and he advised me that a little incision in the vocal cord would be all that would be necessary. I told him that it was not for the purpose of changing articulation, but I wanted a whispering jackass, one that would not annoy the neighbors. Well, he said, that is all you need to do. In my endeavor to make a whispering jackass I took out the entire vocal cord. I presume I needed only to have taken out the arytenoid cartilage, and as a result of the operation which I performed, instead of making a whispering jackass, I don't know what I did make. The bass cords that were in the normal voice of the jackass were cut out, and we had a key that was pitched higher than ever before. It was really pitched so high that it has no equal on any whistle of warning found on any automobile.

But that has nothing to do whatever with roaring. That was just a little experience by which I learned that if you wish to make a whispering jackass, you need to take more than the vocal cord.

Dr. Adams: Perhaps I had better ask for information as to the effect of cutting or otherwise injuring any of the cartilages of the larynx. You know, I presume, that the majority of operators nowadays who remove one or both of the laryngeal sacs, do so through the cricothyroid ligament without cutting either cricoid or thyroid. There are some others, like myself, who always cut the cricoid and I would like information, for my own guidance at least, as to the effect of section or other injury to such cartilages as the cricoid and the arytenoid. I have never seen a chronic chondritis with thickening following the section of the median line of the cricoid, nor have I ever noticed any noticeable stenosis or narrowing of this portion of the larynx following such section. In the first part of a communication, this last year by Prof. Eberlein, Professor of Surgery in the Berlin School, he made the statement that he had never seen chondritis of the larynx following section of the cricoid, nor had he been able to find any other surgeon who had, nor any report of chronic chondritis with thickening of the cricoid from this section. I can assure you that it pleased me to hear him say so, because it coincided with my own experience.

Since that time I have had occasion to open the larynx of a horse on the median line for the third time in the course of about two and a half years. At the second opening of the larynx, one year after the first laryngotomy, I noticed no thickening but the section was made a little harder as if there was a little calcareous infiltration of the cartilage. The third section, two years and a half after the first laryngotomy revealed a considerable calcerous infiltration on the median line of the cricoid, so much that I had to make my section with a scalpel a good half inch or maybe three-quarters of an inch to one side of the median line. I could not cut through the hard mass left by the two previous sections of the cartilage, and yet I was not sure that there was any stenosis. After opening the larynx and spreading the ends of the cartilage apart I could not assure myself that there was any marked stenosis or narrowing of the larynx, even though there was this calcareous infiltration and this slight thickening also of the cartilage.

If we can section the cricoid on the median line by this operation without producing what Dr. Williams says he always fears when he wounds a laryngeal cartilage—that is, chronic chondritis, with thickening and distortion—then it seems to me the operation which involves a cricotomy is a safer one than one in which we cut merely through the cricothyroid ligament. In other words, it seems to me that a large opening in this region, to act as a drainage for the flowing off of saliva and particles of food as well as pus, is a safeguard.

If I remember rightly, Dr. Williams published the results of the first twenty-two operations at Cornell. Am I quoting you correctly when I say that you published the results of the first twenty-two cases at the hospital?

DR. WILLIAMS: Well, possibly so. I could not state the number now.

DR. ADAMS: My memory was that you lost two cases, through inspiratory pneumonia, of the twenty-two that you cited. I believe that the larger the wound is, up to a certain point, the better the drainage and the greater the safeguard against inspiratory pneumonia. Therefore, other things being equal, I would prefer the larger wound. If it is the experience of veterinarians that we can cut the cricoid without stenosis, I believe it is a safer operation. I would like to find out, for my own information, whether it is not just as safe to go through the cricothyroid alone.

DR. WILLIAMS: I would say that the danger which we encountered from inhalant pneumonia has been completely overcome by substituting local for general anesthesia. Nearly all of our operations are now performed upon the standing animal, and if my recollection serves me correctly, we have not had a loss from pneumonia since the adoption of that method.

In relation to the other point raised by Dr. Adams, we have had failures from chondritis after severing the cricoid cartilage, after severing the thyroid cartilage and after severing tracheal rings to perform tracheotomy, and after the use of the steel burr for the removal of the mucous membrane of the laryngeal ventricle. We have not had chondritis in any case where we have avoided all cartilaginous wounds. We use a soft-rubber burr instead of the steel burr. So far as we know we have not yet injured an animal nor had a marked failure under our present technique.

Dr. Adams: I would like to hear from anybody else along that line, particularly as to the production of chondritis, the thickening of the cartilage and the distortion of any portion of the larynx following section or other injury of either the arytenoid or the cricoid.

Dr. Merillat: Mr. President, I believe there is no doubt at all that the section of cartilages about the larynx or stripping them even of their muscular or connective tissue coverings is dangerous. It seems to me that the infection of the larynx from within is more dangerous in this connection than the mere cutting off of the cricoid cartilage as we once did. We know very well that some years ago we actually had to stop operating for roaring because of the fact that a large percentage of the animals evidently developed what Dr. Williams has called chondritis, together with a vastly increased amount of connective tissue elements from the soft tissue. Now the injury in the larynx about the arytenoids seems to be more apt to cause this trouble than the cutting of the cricoid. However, I am satisfied that the optimism expressed by Dr. Adams, as related by the German operator, is not correct, and would not at least apply to the animals that we have in the west. There is danger in cutting the cricoid, but not so great as from infection within the larynx. I want to state also that my experience has been analogous to that of Dr. Williams regarding the use of the steel burr whenever it is not handled carefully. If one harshly strips off the muscle from the internal face of the thyroid wing, leaving it denuded, the result of the operation is not good and the starting point is made for a case of chondritis. I have had two such disasters during the past year, which I attributed to stripping off a little of the cartilage in the internal face of the wing of the thyroid.

It is with this problem in mind that I have presented a paper on roaring to the Association again this year, with the hope that we may discuss ways and means by which a change may be made in the operation to reduce the number of these serious results as low as possible. I think the secret is in operating deftly, with the least amount of traumatism and with the least amount of infection. Of course, as Dr. Adams has said, this is not an operation in which you can provide against infection absolutely, because the wound is exposed from within to secretions over which we have no control. However, by performing the operation cleanly from without, permitting no infectious matter to enter deeply into the ventricle, and leaving everything nice and clean after the work is performed, we are able to do much better work than if these things were neglected.

So, to summarize the safe operation, I would make these recommendations: to be perfectly aseptic; to inflict the least possible traumatism; to strip only the membrane from the sac without taking any of its underlying structures; and not to cut any cartilages, or even expose them.

Dr. Blattenberg: Mr. President, I have observed the use of the burr by some who have commenced to use it, and I have noticed that some have gone at it with a little too much "strong arm" as if it required a great effort. In using it in that manner I think there is injury done. The beginner has to learn how delicate that mucous sac is, usually by bitter experience. Until one has learned how to use the burr, I think it is well to dip the burr into liquid rubber, giving it a rubber coating, and possibly a second coating, which will relieve the burr of its harshness. The rubber can be removed by a solvent like gasoline.

Dr. Williams: Mr. Chairman, if I may be allowed another remark, I think that Dr. Blattenberg has come very near to my ideas when he hides his steel burr under soft rubber. The experienced operator even makes mistakes with the steel burr, and our introduction of the soft rubber burr was along the line of making a fool-proof instrument, and it certainly appeals to us. We have adopted it to the exclusion of the steel burr.

Dr. Adams: I want to be perfectly frank with you. I was very sorry to see the burr come out, for this reason: I thought that I could operate very nicely without the burr, and dissect out the sac. Then when I saw that such a simple thing would immediately pick up the sac and turn it wrong side out, I said, "Well, now, here if a fellow who has invented a screw-driver so that any one can go in there and just unscrew that sac and take it out," and I thought it would make it possible for men who had no familiarity with the larynx to do the operation; but it has not done that.

Now, as I suggested to Dr. Blattenberg last year, the reason the sac is picked up and everted with such difficulty is, of course, merely mechanical; it tends to produce a vacuum in the tissues when we try to draw this sac over the tissues, and it is simply air pressure, sixteen eight-tenths pounds or something to the square inch, that we are lifting when we lift that sac out of the tissues.

It is just as if you had a large milk bottle with a neck sufficiently large for you to pass your hand through. Suppose you had a large nipple that would fit on that bottle; turn the nipple upside down, so that it projects into the bottle, and then cement the edge of the nipple and the neck of the bottle together. Now let us reach in and get hold of the nipple and pull it out. When released it will fly back into the bottle again, won't it? It is the same way with the sac. But if we should puncture the bottle, or if the bottle were cracked, then, of course, air would be admitted on the other side of the nipple, and we could draw it out without any difficulty.

As I suggested to Dr. Blattenberg, if he will break the vacuum in the tissues before he attempts to lift out the sac, then it always will come easily.

How can the vacuum be broken? Just after opening the larynx, insert your finger or any instrument into the sac and put a little tension on the vocal cord; then with the sharp point of a knife you can make a little incision along the edge of the vocal cord, say perhaps a third of an inch long—not a half an inch long—running up about the processus vocalis, to which the arytenoid attaches; then turn the incision and run it up to the edge of the arytenoid cartilage at right angles to the first incision; then with the point of the finger or any blunt instrument pass down through this angular incision, always keeping to the outer face of the arytenoid cartilage, until you have reached the far edge of the arytenoid; then with the burr the sac lifts out easily. It is simply because you have broken the vacuum.

When I mentioned that to Dr. Blattenberg, he said: "Well, now, that explains why, when in the use of the burr the sac begins to tear, it suddenly comes out easily." I have noticed that the tearing of the sac admits air alongside of the burr and breaks the vacuum, and that is why it comes out easily. So it seems to me that we would get the sac out easily and in its entirety if we would break the vacuum in this manner. Have you tried that since, Doctor?

Dr. Blattenberg: I find it much easier when there is air admitted to break the vacuum. It is very much easier to invert.

Dr. Adams: I do not want to appear to monopolize things here, but I would like to say further that I do tracheotomy always, making my incision through the body of the thyroid down to the first ring of the trachea; and I have a record of something over ninety cases in which there have been no deaths and no complications. One death occurred in an animal that was recovering from an operation as a result of pleuropneumonia which he had contracted on the boat coming from Baltimore, and he infected two other animals, one of which died, so that I do not lay that up to the operation at all. I have not noticed any stenosis or any trouble to the cartilage by these wounds suppurating. I presume that if the wound did not suppurate the adhesions would not be as strong as they are, so that I encourage suppuration and expect to see it. I operate always on the animal cast and turned on the back. I used chloroform exclusively in the first eighty odd cases, since which I have used chloral and like it better. I use from 20 to 35 drams of chloral, or four ounces to four ounces and a half, given about eight minutes before I want to operate on the horse. The horse is perfectly quiet then and does not react to the incisions. He is usually on his feet two hours after the operation. A double-sided operation requires as a rule a tube within six or eight hours, although in thin-necked thoroughbreds no tube may be required. The tube that I use is fastened by a tape suture, in the place between the cricoid and the first ring of the trachea, and therefore entirely outside of the larynx. Sometimes it is necessary to leave it in three or four days. I believe that any damage to the arytenoid is followed by chondritis with thickening, and I am afraid of it; but I do not look for it when I cut the cricoid. Whenever I have damaged the arytenoid I have found on a post-mortem examination evidence of that damage in thickening, especially if I have clipped off any portion of the top of the arytenoid.

Has anybody anything to offer for the benefit of the operators, even if it is not along this line?

Dr. Williams: Mr. Chairman, having been engaged in another section, I did not hear the paper read, and have just been inquiring regarding its nature. It seems to me that it might be well to add, in regard to the etiology of the disease, some experience which we recently observed in western New York. Twenty-five mules used upon contract work during the summer were placed in the hands of a canning company apparently well, in November, for wintering upon pea ensilage as a by-product from the cannery. During the winter some two or three animals perished from alleged paralysis, something akin to cerebrospinal meningitis, or forage poisoning. When these mules came out in the spring and were put to work, eight of them roared badly, one strangled to death apparently without provocation, and three were utterly unable to work, because upon the very least excitement they would strangle and fall. Tracheotomy was performed upon these worst cases until the contract was completed, and the seven remaining mules were then operated upon by Dr. Frost and myself, and were found to be typical roarers, or bad cases with bilateral paralysis. This experience is in harmony with a great many recorded outbreaks of roaring in America and in Europe where a large number of animals in a given establishment have suddenly developed severe and fatal roaring, and it has generally been traceable with very considerable clearness to the leguminous food which the animal was fed upon. I think it is well to bear in mind these facts in dealing with the etiology of roaring. What influence do our foods have upon roaring? We know, for instance, that in certain countries, and in certain areas of our own country, roaring is almost unknown, whereas in certain other countries and in certain sections of our own country roaring is exceedingly common.

Dr. Blattenberg: Mr. President, I had a case which resulted in death this last year, before I even was ready to let the horse up, but I did not attribute it to anything connected with the operation, nor did I administer any general anesthetic.

I might narrate my experience to you. It was amusing to me, and I really became a little nervous before I got through. The horse belonged to a German, a very cautious German, who was fearful of anything that took place out of the ordinary, even to the casting of the animal. I had been called quite a distance to perform this operation for another veterinarian. The animal was cast, and the owner became frightened. "Mien Gott!" he says, "that won't kill him to lay him down that way?" I says, "No, it won't hurt him." He says: "You guarantee this?" "Why," I says, "I guarantee it the same as your surgeon would guarantee anything in your family that he was going to undertake, because it is no experiment." "Vell," he says, "go ahead." When I cut into the larynx and he saw the blood, he says: "Mien Gott! that won't kill him, will it?" Thereupon, to ease his mind, I informed him that such a thing is done every time in any similar operation. I opened the larynx, and the exhalations would throw out little spurts of blood from the local hemorrhage which didn't amount to anything. Thereupon he said, "Does that always do that way? It won't kill him, will it?" "No," I said, "It won't kill him." It was a beautiful case of roaring; it was very marked and easily discernible. I removed the lining of the ventricle without any trouble, applying only a little anesthetic. Finally I saw that he began to breathe peculiarly, and I took his pulse. I looked at the veterinarian. I saw that it was a peculiar breathing that I had seen once or twice before; it probably meant death. I felt that something was going to happen when I observed that peculiar breathing and I said to the Doctor, "Was this horse exercised, Doctor?" He said, "I think he was not;" and the German said:

"Why, does it make any difference?" "Well," I said, "it makes this much difference: he was laid down here, and this was an unusual struggle for him; it is like a prize-fighter going into the ring without any preparation, or a man going upon the mat, to wrestle without any preparation. The shock is too severe, it might kill him." "Mein Gott, he isn't going to die, is he?" Breathing became worse and shorter. I took his pulse I said, "Doctor, I'm afraid this horse is going to die." "Mein Gott!" he said, "I wish I never had it done." The horse continued to get worse. I had to lead up to it gently, that fatal results would follow. I said, "He is going to die, I feel most certain, Doctor." He was a well-bred horse; he was a son of Bobbie Burns, and a well-bred trotting horse. So I said, "Doctor, he is going to die." And the doctor looked serious; he should have cried. Finally the horse died. "Oh, mein Gott!" the owner said, "what will I do; I just now had it done. What will I tell my wife?" "Well," I said, "tell your wife this, that when we laid this horse down we discovered a condition there that meant death, regardless of anything, and we simply chloroformed the horse." "Well" he said, "that's all right, I believe that will do, but the fellows around here will just guy me; I have been telling them what a fine operation I was going to have on my horse, and now they will just guy me." "Well" I said, "tell them the same thing; that will be all right." "Well'' he said, "maybe that will be all right." And then he thought of one man who might tell the rest of the fellows, and he said, "Was George here?" We assured him that he was not there, whereupon he said: "Mein Gott! if George was not here then he won't say anything." So with that assurance the thing passed off beautifully. With the oncoming of that sudden change, really I felt that it required hasty resourcefulness. I do not know what killed the horse; it may have been a ruptured heart. He died anyway and he died before we lifted him up; we did not give him any anesthetic, except simply a local application of cocaine.

Dr. Merillat: I would like to hear Dr. Adams' ideas of how or in what way this digestive trouble causes roaring, how he connects the two. Have you any views on that, Doctor?

Dr. Adams: No, I have not. I could say though that it has been recognized for a good while that overeating some of the vetches produces roaring. Peas, of course, is a variety which causes apparently a toxemia that leads eventually to roaring, but I don't think anybody has explained how it occurs. They probably do not understand.

Dr. Gill: Mr. Chairman, I am inclined to the belief that toxemia has but very little to do with roaring. It is the impression that roaring is due, especially where the left recurrent nerve is affected, to violent action of the heart, and it does not make any difference what causes it; there are many conditions that do cause it. Where you have the strangles, there is an interference with the circulation, there is a temperature, and you all know that the heart is caused to act violently. Where you have an interference with the respiration, it is reflected and reacted directly upon the circulation; the action of the heart has increased. Now, you know that with toxemia we have some other nerves affected. Why should the nerves be specially picked out by this toxemia?

Dr. Adams: Well, Doctor, you were not here when that subject was alluded to. The case was stated where there were some seven or eight mules affected, and they were all double-sided.

Dr. Gill: Yes, but I believe that the effect of these agents upon the stomach is reflected through the pneumogastric nerve, which increases the heart's action and in that way through the direct pressure of the aorta upon the left recurrent nerve we get a degeneration and a paralysis of that nerve.

I haven't heard anybody explain to my satisfaction that there is any other reason for this paralysis and I am speaking now from a practical point of view and appealing to your common sense. It is my impression, based upon my experience in what I have seen and what I have noticed that first it is the action of the heart which causes paralysis of the left recurrent nerve, induced by many causes; secondly, overloading the stomach, and interference with respiration, and many other causes that I will not take the time now to enumerate. But I cannot for the life of me see where you can attribute the paralysis of the left recurrent nerve to toxemia.

Dr. Adams: No, you misunderstand. He was not attributing it to that. The animals had toxemia, and it caused a double-sided paralysis.

Dr. Gill: Well, I think it has the same effect if you have a double-sided paralysis, but I will eliminate the double. I don't know anything about that, but I am speaking now of paralysis of the left recurrent nerve. I can't see why toxemia would affect both of the recurrent nerves, when some other part of the body and some other part of the nervous system is not affected, or the brain is not affected.

Dr. Adams: It seems to me that it is the duty of veterinarians interested in this subject to place data respecting the left and right recurrent nerves of those roarers that fall into their hands during the next year in the possession of trained histologists, that we may search this thing out further. Evidently there is where our work needs to be done. I doubt whether any man in active practice would not have a carcass of a roarer fall into his hands at least once a year, and if we should now pick out some trained man into whose hands we would place this material when we got it, I think we would be doing ourselves and the profession a great good. We can theorize upon the results of pleurisy and pericarditis and the sequels of bronchial pneumonia and enlarged glands and toxemia and all these things; we can theorize upon the effect of these things upon the nerve, but we want to demonstrate facts by cutting the nerves out and having an expert make a histological examination of portions that are healthy and portions that are apparently not healthy, and then we will have some definite evidence. Otherwise we are merely guessing, at least I know I am, when I talk about the causes of roaring.

Dr. Merillat: In this regard I would like to say that Dr. Phelps, who is very much interested in this subject, is quite a histologist. He has told me several times that these investigations are very doubtful of result. They are not positive; it requires the making of a number of sections of each kind in order to make comparisons. Roarers are not plentiful, and it takes time to get together data enough to settle these questions. I am hoping that this is the start of an investigation to actually settle this matter of remote etiology.

Dr. Adams: Gentlemen, is there anything further upon this subject? I might perhaps deviate a little from the subject matter and speak of other phases of the roaring question.

In the matter of the dyspnea that follows an operation, in my experience with well-bred horses, thoroughbreds or seven-eighths or three-quarter bred horses, the one-sided operation, as a rule, requires no tube. When there is dyspnea, it begins eight hours or more after the operation, and when it once arises it comes to a crisis very rapidly. A horse begins to get dyspnea, he gets excited, and that excitement makes him breathe faster and the more violently he tries to inspire the more quickly and tightly the arytenoids are driven together. Therefore a horse beginning to feel a little dyspneic may be staggering on his feet in a minute or two. When I do the double operation, on either a well-bred or a lymphatic horse, I always feel that I am going to need the tube, and I do not wait until the horse shows symptoms of dyspnea, but put the tube in immediately. As a rule, it can be dispensed with by the fourth or the fifth day. You should take the tube out every day and replace it with a clean one, and on the fourth or fifth day you should leave the tube out a few hours and watch the horse. If there is no evidence of dyspnea during that day, I think it is well to leave the tube out until night, but I think such a horse should carry the tube during the night if there is not a man on duty, because I have known of two cases where horses have been apparently all right at night and been dead in the morning, having worn the tube up until the day before death. So I presume dyspnea arose during the night and the animal suffocated, not having had the tube.

I have not much to say about the shapes of tubes, but as to the material, I think a soft rubber tube is the one that cannot do damage within the larynx. It may be very heavy white rubber about a half inch in diameter, or it may be the red flexible thick-walled rubber tube. I think the latter is really excellent. I have seen damage done to the posterior or superposterior wall of the larynx by the end of the tube; and, while Dr. McNeil's tube appealed to me first, I thought, on examination that it would turn a somersault. There is nothing to prevent the tube from tipping forward, and until the end is impaled against the upper wall of the larynx, it will turn a somersault forward.

One reason why I like the operation I perform is, when I insert the tube it is not in the larynx at all; it is below the larynx and outside of the larynx entirely. Now, I may possibly need the tube on the second day; so I put the tape in place and tie it with long ends in a bow knot, so that if the horse becomes a little dyspneic an attendant in the stable can slip the tube in, and by tightening up the bow knot no pain is caused, no operation is necessary, and everything is ready for the reception of the tube.

Dr. Merillat: I have here a paper on the subject, "Anesthesia" prepared by Dr. H. E. Kingman. I move that this paper be read by title and published in the *Proceedings* of the Society. (Motion seconded and carried.)

ANESTHESIA

By H. E. Kingman
Fort Collins, Colo.

In the way of apologies for parts of this paper and the length of it, I wish to state the instructions from the committee that assigned me this work.

"It is very desirable to have the subject of anesthesia discussed in order to bring out the present merits and future possibilities of anesthesia. In their fear of inhalation anesthetics, veterinarians are always looking about for some satisfactory substitute in the form of narcotics, usually administered subcutaneously, and upon which they often place much dependence. The report should present the subject of 'general and local' anesthesia and should treat with as much detail as possible."

The paper is so arranged, however, that the time of the Association need not be taken up with material that is not of vital importance and can be found in text-books. Only that part that is in large print is considered by the writer to be of the most importance.

There are a number of terms applied to agents which relieve or modify pain, and while they are practically synonymous in derivation, still usage has given them certain restrictions and shades of meaning. So it becomes necessary before proceeding with this paper to reach an understanding in regard to some of them.

Anesthesia, accurately speaking, denotes loss of sense of touch; but the term is used to indicate the loss of all forms of sensibility, as pain, temperature, etc.

Analgesia is a term employed to denote the loss of sensibility to painful impressions. It is probably a better term to describe the phenomena than "anesthesia," but usage for some reason has chosen the latter.

Anodyne also refers to the relief of pain, but is usually applied to an agent that is used for external application, or perhaps internally to relieve pain or spasm, as "Hoffman's Anodyne."

Hypnosis really means sleep, and is used sometimes to describe a certain stage of anesthesia, but is more correctly applied to a condition produced by hypnotizing.

Narcosis means numbness, but is frequently used synonymously with "anesthesia." Some writers use it to describe the poisonous or toxic stage of anesthetics. Because of this apparent cloudiness in its meaning it will not be used in this paper.

In the discussion of anesthesia in this paper the writer has only considered such uses of agents as apply directly to operative procedures. Most of these agents, whether local or general in action, may be used outside the operative field, as in pruritus, bee stings, cough, painful wounds, bruises, sprains, corneal ulcers, vomiting, numerous forms of colic, strychnine poisoning, inflammation of the mucous membranes, orchitis, and other innumerable painful conditions where either for the comfort of the patient or for the promotion of healing, a general or local anesthetic may be used.

HISTORY. There can be no doubt that human beings from the earliest times endeavored to relieve pain from disease, injury and operations by the use of measures or drugs that would benumb the sensation. Pliny tells us that mandragora is taken against cutting and punctures lest they be felt, and Apulesius stated that, "if anyone is to have a limb mutilated, burnt, or sawn, he may drink a half an ounce of mandragora and wine and, while he sleeps, the member may be cut off without any pain or sense." The Chinese and East Indians used, in very early times, full doses of cannabis indica for the same purpose. Nor were these ancient practitioners satisfied with the ingestion of the drug by the stomach, but they often produced insensibility to pain by making the patient inhale the vapor of burning cannabis indica, or, in the case of mandragora, from having them smell it. These methods, often combined with the use of intoxicating doses of alcohol, were the only ones employed until the middle of the fifteenth century, when Theodoric produced anesthesia by the use of the "spongia somnifera." This was prepared by boiling the sponge in water to which has been added juices derived from a number of sources, the most important being mandragora, opium, hyoscyamus and hemlock. When the boiling had been continued until the sponge held all the residue in the vessel, it was placed aside to dry. When needed, this sponge was thoroughly soaked in hot water and placed over the patient's face, who inhaled the fumes until insensible. It is interesting to note not only that anesthesia by inhalation was produced, but that, after the operation was over, the patient was resuscitated by inhaling vinegar from another sponge, the plan of resuscitation often utilized by modern surgeons to prevent nausea following ether and chloroform.

Various mechanical devices whereby pressure upon nerves of a part was brought about were also employed for many hundred years for the relief of pain, and hypnotism was resorted to, but with little success for obvious reasons. Binz quotes a passage from Paracelsus (who died in 1541), in which Paracelsus recommends for internal use, for the relief of pain, in preference to opium, a drug, which he thinks must have been identical with sulphuric ether, as the discovery of ether is usually credited to Valerius Cordus who was not born until 1515, it is manifest that the fluid used by Paracelsus could not have been ether, or that Valerius Cordus is not the discoverer. Cordus undoubtedly produced ether, but more than two hundred years elapsed before anything further was done concerning it, until Froben, a German chemist in London, made it, but kept the method of its production a secret. In 1731 Stahl made ether in Berlin, first calling it sulphuric ether, thinking it was a modification of sulphuric acid.

The real history of surgical anesthesia is, however, to be found in the last one hundred years. It is true that Pearson, of Birmingham, gave ether vapor in 1795 to diminish the sufferings of advanced tuberculosis. In 1818 Faraday stated that the inhalation of ether vapor decreased pain, as did nitrous oxide, and Thompson, of Glasgow, showed his students that if he inhaled this vapor the pain of minor injuries was not felt. Here on the threshold of one of the greatest discoveries of modern times the profession marked time for forty four years, and the step between the partial benumbing of the sensation, as an amusing experiment, to the production of true anesthesia, was not taken. It is interesting to note that, although it was stated in 1862 by Mareno Maiz that cocoa leaves, if chewed with potash, produced anesthesia of the lips and tongue, it was not until 1884 that Keller introduced cocaine as a local anesthetic.

In 1839 a medical student, named Clark, in Rochester, N. Y., gave ether to some of his friends to inhale for amusement, and one of them, Morton, three years later (1842), used it to permit him to extract a tooth painlessly. In this same year some students in Anderson, S. C., inhaled ether vapor for the purpose of getting drunk, and while intoxicated caught a young negro and forced him to inhale so much of it that he became unconscious and apparently dead, greatly to their alarm. The boy recovered, and one of the students told Croford Long of the occurrence. Long, in this same year, 1842, removed a cystic tumor from the jaw of a patient under the influence of ether, and repeated the experiment a number of times, but he failed to grasp the extraordinary value of the idea or was too careless to report it at the time. In any event he failed to keep on using the drug.

On the other hand, Morton, who had first extracted a tooth for a patient under ether in 1842, as already stated, was alive to the value of this discovery, but it was not until 1846 that he did anything more about it. In that year a chemist of Boston, named Jackson, who was instructor of Morton, suggested to Morton that some pure ether be prepared and used for surgical purposes. Morton claimed, the ether having been made, he tried it before Jackson did so, and these men ceased to accuse each other of the theft of an original idea only when the grave closed over them. There can be no doubt, however, that Morton deserves the credit for the actual introduction of the ether, for in September, 1846, Morton gave ether and pulled a tooth without pain to the patient, whose prolonged unconsciousness, however, frightened him so much that he did not dare to continue his experiments for some days. The critical day at last arrived when he persuaded Warren to let him try the drug in the Massachusetts General Hospital, Boston, in a case of tumor of the neck upon which Warren was about to operate. The effect was so satisfactory that Warren said to his class, "Gentlemen, this is no humbug," and Giglow exclaimed, with less enthusiasm, "I have seen something today that will go around the world."

While this is the history of anesthesia from a human standpoint, Morton is said to have first tried complete anesthesia on a dog and then on himself.

Literature on the veterinary use of anesthesia evidently has not been worthy of anyone's effort of recording.

Physiological action of chloroform: There is no drug or medical substance that has been so carefully and constantly studied by the bedside, the operating table, and in the laboratory as has chloroform, and there is certainly no drug which during the last fifty years has given rise to more discussion. Indeed, it may be truthfully said that no other subject in the realm of medicine has received such universal attention in every line, and by men in almost every department of medicine and surgery, not excluding the pathologist.

Chloroform acts upon the living protoplasm as a depressant or paralyzant, the difference in its action in various quantities, large or small, being a difference in degree not in kind. Any apparent stimulant effect is in reality due to its primary irritant properties, and any increase in the rapidity or depth of the respiration and in the speed and vigor of the heart or rise of the blood pressure being apparent and not real, or, if real, dependent upon psychic effect of the drug or to the primary irritant effect of its vapor, if it is used in concentrated form. Although clinically, and in the laboratory, many observers have reached conclusions that are at variance with some of the following statements, I nevertheless believe from a careful study of the literature and my own observations that they give briefly the actual effect of the drug upon the nervous, respiratory and circulatory systems of a healthy animal.

Given by inhalation, chloroform, after a brief quickening of the pulse and respiration, causes a gradual decrease in the activity of the perceptive portions of the cerebrum, followed or accompanied by obtunding of intellectual activities (of the anterior frontal convolutions), and, finally, if the dose is adequate, produces a similar state of quiescence of the motor portions of the cortex. It also depresses the sensory pathways in the spinal cord, and, if still further pushed, depresses the sensory portions of the medulla. If still further pushed, the motor portions of the cord and medulla are depressed, but when this effect has been produced the drug has been used to a degree considerably in excess of the amount which should be employed for surgical anesthesia. A step more, and the vital functions which reside in these parts will be abated, and death will ensue. It is by its action upon the perceptive centers in the posterior convolutions that the chief anesthetic effect of the drug is produced, for as already pointed out it is possible by its use to cause diminished sensibility before cerebration in the sense of thought, is ablated and before voluntary movement is arrested. The exact change produced in the cells is generally believed to be a solution of the lipoid substance, which, however, is not removed from the cells, which return to their normal state as the effects of the drug cease.

Upon the respiratory and circulatory systems the action of the drug is forcible and important. There can be no doubt that the dominant effect of the drug upon the respiratory center is depressant, but this action is in part due to the alteration in the blood supply to the medulla and is not a factor of great importance as compared to its circulatory effect. In other words, the drug in any dose within the limits of ordinary usage does not cause death by direct depression of the respiratory centers in a previously healthy person. The changes in the blood supply of the medulla and the effect upon the mind of the patient may alter the rhythm and depth of the respiratory movements, and these are to be carefully watched, not because they directly presage disaster, but because they afford an opportunity to determine the dose of chloroform being inhaled, the quantity upon the inhaler not being a gauge. In other words, the respiration needs to be watched, because if deep, rapid, or stormy, a dose of the drug may be taken which will produce disaster to the circulation and indirectly to the respiration. Those who at the present day advocate watching the respiration rather than the pulse, do not do so because they believe that death is due to failure of the respiratory center, but because they regard this function as a delicate indicator of good or evil progress.

In all cases, watching the respiration is more important than watching the pulse, because by this means we estimate the dose, and we estimate how much the respiratory center is suffering from a failing circulation, whereas when the pulse flags or stops, the danger is so imminent that it may not be put aside. If possible watch both functions, but if not both, then watch the breathing.

When we come to discuss the effects of chloroform on the circulation itself, we meet with the chief field of physiologic debate. There can be no doubt whatever that chloroform in any dose diminishes cardiac power rather than increases it, but there can also be no doubt whatever that when given to a healthy animal the depression of the heart muscle is not the chief primary effect upon the circulation. The primary and chief effect is upon the vasomotor center, and possibly upon the muscular coats of the vessels, and, as a result, chloroform always causes a fall of blood pressure from the very first moment of its use after the nervous apprehension of the patient ceases.

This fall of blood pressure is not alone due to depression of the vasomotor center, but in part to the dilatation and diminished power of the heart, which in consequence drives the blood with less power and in less quantity a minute into the arteries. As the pressure falls the blood supply to the medulla and the respiratory center is decreased and the functional activity of these parts is diminished, partly by the direct and partly by the indirect effect of the blood. Aside from the experimental evidence of this fact, the whole history of the methods of restoration in chloroform accidents reveals that the object aimed at is an increase of the supply of blood to the medulla.

The inversion of the patient, the application of bandages to the limbs, the employment of atropine to prevent or relieve "bleeding into the vessels" of the splanchnic area, are all efficacious, because they supply the medulla with blood, and they would be futile if the impending death were due to cardiac failure or arrest. Incidentally, of course, the restoration of the medullary activity and arterial pressure supplies the coronary vessels with more blood, and so the heart is bettered.

To sum up, therefore, chloroform may be said to act primarily upon the vasomotor center, secondarily upon the respiratory center, directly and indirectly, and, lastly, upon the heart. Of course, any sharp dividing line between these effects is impossible, and all are depressed simultaneously, the difference being in degree. The statements just made do not in any way whatever deny that chloroform may cause death by sudden cardiac failure, the arrest of the heart in such a case being the dominant effect of the drug, because what holds true of the animal in health does not hold true of an animal that is diseased.

We come then to the important question of the influence of chloroform in producing cardiac arrest through irritation of the vagus nerves, the reflex starting through the trigeminum or the laryngeal nerves. Although it is impossible to arrest the heart permanently in a healthy animal by increasing vagal activity, this influence, in case of myocardial disease, or when the heart is depressed by chloroform, may be the last straw to turn the balance.

Chloroform exercises no direct effect upon the blood. The drug is carried by the corpuscles, not the plasma, except to a very slight extent.

The effects of chloroform or any other anesthetic, for that matter, do not depend upon the quantity placed upon the inhaler nor the quantity taken into the lungs, but upon the amount which is absorbed from the lungs by the blood, and again upon the amount that is absorbed by the tissues from the blood, and particularly those tissues of the nervous system which are closely associated with vital functions. The lethal dose of chloroform in the blood is about double the anesthetic dose.

It would seem probable that the accumulation of chloroform in the tissues depends to a certain extent upon their activity and the activity of their blood supply. Where the circulation is free and the chloroform is deported from the tissues almost as rapidly as it is imported, the danger is much less than if the circulation is impeded, since under these circumstances, the importation is more rapid than the deportation. This is probably one of the reasons why asphyxia, which always results in venous congestion, and struggling on the part of the patient, which produces a similar effect, is so prone to be accompanied by chloroform accident. It would also seem probable that the longer chloroform is administered the greater the quantity accumulates in the tissues. This is manifest from clinical observation that patients that have inhaled chloroform during a long operation exhale this drug in their breath for many hours after the anesthetic has been discontinued; whereas this does not occur if the use of the chloroform has been brief. The presence of chloroform on the breath one or two days after the operation shows that it must have been stored in the tissues. This storing of chloroform in the tissues also explains why it is that delayed chloroform poisoning develops after prolonged operations more frequently than after short ones. All of these facts serve to emphasize the necessity of administering chloroform slowly and deliberately.

Chloroform is rapidly eliminated by the lungs, and if given freely, by the kidneys, which it may irritate, but not sufficiently if they are healthy for this effect to be given serious consideration.

The pupils are slightly dilated under chloroform. Wide dilatation is an alarming sign, since it often shows relaxation of sphincter muscles, which is associated with impending death.

As has already been stated the centers governing the various functions of the body succumb to the influence of anesthetics in the inverse order of their development. This is known as the law of dissolution. The functions of volition, motion and sensation are first to suspend activities, while the heart and respiratory apparatus continue their duties.

Anesthesia of the Horse. Complete anesthesia of the horse offers to the average practitioner so many obstacles that he is inclined to get along by subjecting the horse to very severe operations without any attempt toward relieving the animal's suffering, so it is the object of this paper to convince more veterinarians of the value of general anesthesia, at least it certainly is our duty to prevent as much as possible the suffering that is concurrent with the operation that we are called upon to perform.

The principal arguments brought against the use of anesthetics are:

That it is seldom the practitioner has help that can be depended upon to administer an anesthetic;

That it only adds to the expense of the operation and abstracts just that much from the veterinarian's profit;

That there is more or less danger connected with the use of general anesthetics;

That there is great loss of time.

Whether these arguments will hold true depends, first, upon the method of anesthetizing, and, secondly, upon the operation to be performed. The danger of injury is reduced to a minimum and those who are accustomed to the use of general anesthetics in the horse know that he is a very fit subject.

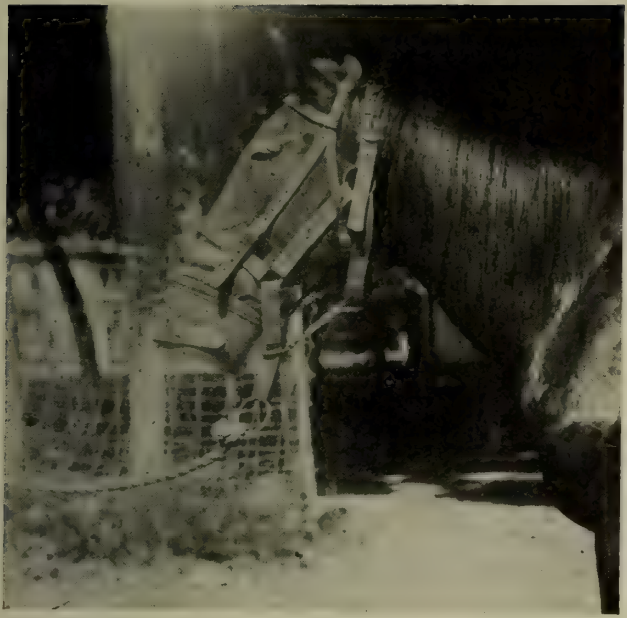
It is the object of this paper, then, by the methods and indications herein described, to prove that these objections can be successfully overcome, but not, however, to advocate the use of a general anesthetic for minor operations that may be quickly performed without much danger from either infection or loss of blood. But where asepsis is at least desirable, the loss of blood likely to become serious, the pain severe, and the success of the operation dependent upon the thoroughness of the operation or technique, then an anesthetic should be used and the owner will gladly pay for the extra cost of the agents necessary.

Methods of Anesthetizing. There are two methods of anesthetizing a horse which, in the hands of the writer, have proved very satisfactory.

First Method. About one hour before the operation the animal should receive per rectum one and one-half ounces of chloral hydrate dissolved in a quart and one-half of warm water. (This applies to a horse weighing one thousand pounds.) A stronger solution than this should not be used, since chloral is very irritating and may in concentrated solutions cause proctitis. Before this is given the feces should first be removed without the use of an enema, as absorption takes place more rapidly from a dry surface. The solution is best introduced by the gravity method. A catheter placed over the common hard rubber nozzle of a fountain syringe serves a very good purpose. If the solution can be placed as far into the bowel as the length of a rubber catheter, then absorption takes place rapidly and the solution is perfectly retained. The administration of one and one-half quarts of solution should occupy about ten to fifteen minutes. In ten to twenty minutes after the administration of the chloral the animal will become drowsy and stagger when forced to move, it may then be cast or placed upon a table with little difficulty and the anesthesia completed with chloroform. During the administration of chloroform the animal's head should be lower than the rest of the body to permit the escape of secretion from the upper air passages. A rubber cloth (buggy curtain or lap robe) wrapped around the nose aids in preventing the waste of chloroform; a canvas nose-bag serves a very good purpose or the special inhaler shown in the illustration works very nicely but is by no means necessary; in fact, in the majority of cases the anesthetist prefers to waste a little vapor rather than to be bothered with anything over the nose. The animal being in a recumbent position the anesthetist sits on the animal's head; the chloroform for immediate use should be kept in a two-ounce bottle with a cork grooved on both sides; a sponge the size of one's fist is better than cotton since it does not pack into a small wad and permits a better evaporation of chloroform. The saturated sponge should be held in one hand beneath the lower nostril while the other hand should be free to manipulate the upper nostril. As the animal inhales, the upper nostril should be closed and the sponge held lightly over the lower, and upon exhalation the sponge should be pressed tightly over the lower nostril and the escape of air only permitted through the upper. This prevents the animal from blowing the vapor away upon exhalation and forces a greater intake upon inhalation. The sponge being beneath the lower nostril there is not the dripping of chloroform upon the nasal mucous membrane and the resultant irritation.

Second Method. A method that has been very satisfactory consists in starting the administration of chloroform while the animal is in a standing position. Here the special inhaler is a great advantage but a common nose-bag may be used. The objectionable features to this method are that the animal sometimes becomes unmanageable and that it requires more chloroform than by the other method. The length of time consumed in anesthetizing is practically the same. In most cases, however, the period of excitement is hardly noticeable, and almost any degree of anesthesia may be obtained and retained. For instance in the repulsion or extraction of teeth, it may be only necessary to induce partial anesthesia and that for only a short time, this may be induced in the majority of cases in the standing position satisfactorily, but once in a while an animal will not respond nicely to it.

Indications of Safe Anesthesia. The corneal reflex should be slow in responding or fail to be present at all; struggling should cease and the muscles of the tail and limbs become relaxed; the respiration should be slow and the movements of the thorax diminished. The respiration is the most important of all the guides and should be constantly watched. The heart will probably be accelerated on account of paralysis of the moderator center, but the pulse should remain regular and full up to the moment when intoxication occurs. Sensation will be lost and the animal will not show evidence of pain when the knife is applied.



Special nose-bag for administering chloroform.

DANGER SIGNALS. As already stated, the respiration is the first of the important guides to show sign of distress; the breathing becomes shallow and rapid and later intermittent, ceasing entirely for short periods, which become longer until the movements fail altogether. The heart may continue strong even after the respiratory movements have ceased, but the pulse is not a good guide to follow since the true condition of the heart is not always characterized by the pulse. Frequent twitching of the extremities often occurs shortly before paralysis of the heart and respiration; the blood which escapes from the wound may suddenly cease flowing and turn dark in color; rapid dilatation of the pupil at an advanced stage of anesthesia is a sign of bulbar intoxication and of imminent syncope; loud snoring is indicative of dropping of the tongue into the fauces; involuntary micturition and defecation usually occur just before death.

METHOD OF RESUSCITATION. Discontinue the anesthetic; remove all harness, hobbles or other apparatus that might interfere with respiration; change the position of the animal (tie ropes to the horse's feet and turn him over), this is to prevent hypostasis of blood; artificial respiration may be induced in the horse by slapping the ribs with the hand or even jumping up and down on the thorax with one's knees; vapors of ammonia may be inhaled during artificial respiration; intravenous or deep muscular injections of spirits of camphor, 1 ounce, or atropine sulphate, ½ grain, may be given. (Caffeine and strychnine are of secondary choice.) After complete anesthesia a horse usually requires one-half to one hour before rising, and then he should be steadied to prevent falling. In a mare that was anesthetized during an obstetrical operation it was four hours before she stood, the loss of blood and amount of chloroform consumed probably accounted for this.

CONTRA-INDICATIONS. It is probable that the most common contra-indication for the use of chloroform in equine practice is "heaves." In that there are usually cardiac lesions in the pronounced cases of pulmonary emphysema, and the breathing is so much disturbed, that the administration of chloroform is at least hazardous.

ANESTHESIA OF THE HORSE UNDER METHODS AND DRUGS OTHER THAN THOSE MENTIONED ABOVE. *Intravenous Injection of Chloral Hydrate.* After seeing a great many dissection subjects anesthetized in this manner the writer tried it on six surgical cases. The sixth one, however, developed phlebitis and died as a result of sloughing the whole of the jugular vein and developing septic infection. This concluded his experiments along the line of intravenous use of chloral. No literature is available on the subject.

Intra-spinal Injection of a Solution of Cocaine. In the two cases experimented upon the results were not satisfactory.

Morphine is very unsatisfactory in the horse, causing delirium and excitement. Even with the addition of hyoscine, morphine has proved of little value as a general anesthetic. In small doses, however (morphine 1 grain and hyoscine $\frac{1}{6}$ grain), pain from such causes as mild forms of indigestion, may be relieved. (The advisability of this is even doubtful.)

I have had no experience with the intravenous injection of gelsemium or cannabis indica.

General Anesthesia of the Dog. Only within the last few years have we settled down to a nearly uniform method of anesthetizing the dog for surgical purposes, and the method now in vogue is so simple and satisfactory that it is hardly worth while to discuss other methods.

The one base that is most frequently used is morphine. Morphine alone produces a stupor that will permit of most minor operations; but even with large doses the patient may be aroused by pain or even by being spoken to, and is inclined to become more or less rigid so that it has been found that by the addition of hyoscine or scopolamine a more profound sleep and relaxation may be induced.

The anesthesia may be started with morphine, 1 grain, hyoscine hydrochloride, $\frac{1}{25}$ grain; these should be given one hour before the operation. In most cases the patient will show increased salivation in two to five minutes, vomiting in five to fifteen minutes, and very frequently micturition and defecation. This prepares the patient for an operation about as well as one could wish. The stupor will increase for about one hour and last for six or eight hours. The size of dose may be increased in proportion to the size of the dog. Very small dogs, as the Chihuahuas, should be given only a $\frac{1}{2}$ grain of morphine sulphate and $\frac{1}{50}$ grain of hysocine hydrochloride, while a Collie or Greyhound should be given from 1 to 2 grains of morphine sulphate and $\frac{1}{25}$ to $\frac{1}{12}$ grain of hyoscine hydrobromide. This makes it possible to keep the dog quiet and free from pain for four to six hours after the operation and establishes the best condition for securing union by first intention in the operative wound and immobility in fractures.

If at the time of the operation the anesthesia is not complete, and it usually is not, then ether may be used, the effects of which last only so long as the ether is administered. When the inhalations are removed then the animal returns to the semiconscious stage it was in when the ether was administered.

Indications of Safe Anesthesia. The respiration becomes very slow from the effects of morphine and hyoscine, which is sometimes rather alarming. But out of more than one hundred cases anesthetized by this method there was not a death from the anesthesia. One case, a Chihuahua bitch, weighing $7\frac{1}{8}$ pounds, ceased breathing but was readily resuscitated.

If it is deemed necessary a general stimulant may be given at any time before, during, or after the administration of the anesthesia. Strychnine sulphate in $\frac{1}{30}$ to $\frac{1}{60}$ grain doses will probably serve the better purpose; atropine seems to cause a delirium when given with or following the administration of morphine. Cactin is sometimes used but is known to be inert.

Resuscitation may be hastened by the inhalations of ammonia and by manual manipulations. If respiration ceases the ether should be removed and artificial respiration induced by patting on the dog's thorax, changing position from side to side, stretching and flexing the body by holding the forelegs in one hand and the hindlegs in the other, squeezing the thorax rhythmically may aid the heart's action or even start it to beating after its action has ceased. In human practice the heart is sometimes massaged directly, but if this has been done in veterinary practice the records are not available to the writer. Jerking the tongue or dilating the sphincter ani are said to stimulate certain reflexes. Undoubtedly a great many cases have been lost from anesthesia for the lack of an effort to resuscitate the patient.

Anesthesia of the Cat. The feline is a very nice subject for the administration of chloroform. There seems to be nothing unusual nor difficult in regard to the procedure or technique. The only admonition being to "give plenty of time, not forcing the inhalations too rapidly."

In a number of experiments with the use of chloroform in the cat the writer has purposely pushed the anesthesia until respiration ceased. It was found that in some cases two minutes might elapse after the last respiration and the animal still be resuscitated. Upon exposure the heart has been known to beat for more than two hours after the respiration ceased.

LOCAL ANESTHESIA. Freedom from pain, without disturbance of consciousness, may be produced either by the action of an anesthetic upon the terminal branches of the sensory nerves in an organ (terminal anesthesia) or by the action of a similar agent upon any point of a sensory nerve in its course from the organ but still outside of the spinal canal (regional anesthesia) or within the canal, in the subarachnoid space (subarachnoid anesthesia).

The entire integument, although varying in degree, is endowed with all the four modalities of sensation, viz., the sense of pain, cold, pressure, and heat. The superficial connective tissue, the aponeuroses, and the muscles possess the sense of pain in a much less degree than the integument. Through these tissues the sensory nerves pass from the integument toward the great nerve trunks and the spinal cord. In order, therefore to operate painlessly upon these tissues, it will be necessary to either completely anesthetize the entire operative field by one or more perineural or endoneural injections, or at a sufficient length of time before the operation to saturate the entire operative field with a weaker anesthetic solution, thus absolutely cutting off all transmission of pain from these tissues, both through their own terminal nerves and also through nerves which may traverse them. Tendons are believed to have little or no sensation, but the connective tissue around tendons, the periosteum, the perichondrium, and the articular synovial membranes, have a highly developed sense of pain. The bone substance, the bone-marrow, and the cartilages do not possess any of the four modalities of sensation. Provided a part of a bone has been scraped clean of periosteum any operation may be done painlessly upon it. If the medullary canal of a long bone has been opened at any point, the marrow may be painlessly scraped out for the entire length of the bone. Articular surfaces covered with cartilages have no sensation, nor the interarticular fibrocartilages of the stifle joint. As in the consideration of general anesthesia it is the policy of this paper to discuss the most important methods first and leave the others to the choice of the reader for consideration.

Also the writer has only attempted to describe the surgical use of these agents in an operative sense omitting their value in overcoming pain due to bruises, burns, and strains and in controlling itching.

Cocaine-adrenalin Anesthesia. While there are a number of other agents now upon the market, it is the opinion of the writer that none of them have equaled this combination in efficiency. The expense of course is against it, and large doses of cocaine are toxic for all animals. However, since local anesthesia is only practical in minor operations, the dose required to produce anesthesia need not cause undesirable results. In addition to the advantages obtained from adrenalin in preventing hemorrhage, it tends to enhance the value of the anesthetic by preventing its absorption and thus holding it in the tissues. A 1 to 10,000 solution of adrenalin is usually employed and it should be fresh (not in the least colored). The strength of the cocaine solution depends upon the area to be anesthetized. For terminal anesthesia a 2 per cent. solution is strong enough and should be deposited in small quantities placed closely together. Not more than 5 or 6 grains should be used at one time. If a nerve trunk is to be blocked, as in neurectomies, then a stronger solution is advisable. The following solution consists of a little more than 5 per cent. cocaine and 1 to 10,000 adrenalin:

Cocaine hydrochloride, 0.24 (4 grs. = 4 grs.).
Adrenalin chloride, 1 to 10,000, 0.5 (7.5 min. = 15 drops).
Normal salt solution 4.5 (67.5 min. = 1⅛ drams).

One-half of this formula is sufficient for blocking a nerve and should be placed as close to the trunk as possible. The anesthetic action begins in about three to five minutes and lasts for thirty minutes, and with the exception of quite large vessels the area is rendered bloodless. The actual cost of this formula should be about fifteen cents. As substitutes for cocaine the following agents have been suggested and these have come into use in human practice largely because of the toxicity of cocaine, but in veterinary practice this phase is not nearly so serious and need not influence greatly the use of the more efficient drug.

Novocaine. It has been found that novocaine is a powerful but fleeting local anesthetic, of no practical value except in conjunction with adrenalin. In a concentration twice that of cocaine and combined with adrenalin, novocaine may take the place of cocain everywhere in terminal and conduction anesthesia. It is not so poisonous as cocain but more expensive.

Beta-eucain, holocain, tropacocain and *stovain* have the same action as cocain but may be used in larger quantities. Their value is not greatly enhanced by the use of adrenalin, in fact, it is said the latter is almost useless when combined with tropacocain.

Eucain, although it is an efficient anesthetic, produces a congestion of the conjunctiva, and it is not to be compared with in value to cocain. It has the advantage, however, of not being decomposed by boiling and is a useful drug for subcutaneous injection. For infiltration anesthesia of the eyelids the following formula is recommended: sodium chloride, 0.8 gm.; beta-eucain, 0.2 gm.; adrenalin chloride (1 to 1000 solution), 1 gm.; distilled water, 100 gms.

Holocain in a strength of 1 per cent. produces local anesthesia in from fifteen seconds to one minute, and has the advantage over cocain of not enlarging the pupil or increasing intra-ocular tension.

Acoin, a drug related to caffein and theobromin, is an active local anesthetic in unirritated eyes, in a strength of 1 to 100 or 1 to 300. In congested eyes, however, repeated instillations do not produce satisfactory anesthesia.

Alypin, the glycerin derivative, in 2 per cent. solution, causes a local anesthesia, but creates a dilatation of the superficial vessels, and its instillation is followed by smarting. It is not as satisfactory as cocain.

Quinine and Urea Hydrobromide. Quinine and urea hydrobromide, in the hands of the writer, has not proved to be satisfactory. The best that can be said for it is that it is cheap. At least its action is uncertain and its use in concentrated solutions is likely to be followed by considerable swelling and perhaps sloughing. However, a writer in the *Therapeutic Gazette* makes the following claims for it: "At least twenty minutes should elapse after the administration; post-operative anesthesia lasts, on an average, three days; it is less expensive than cocain; is soluble in alcohol and water; is only indicated in minor operations; the technique is the same as for cocain; a 1 per cent. to 2 per cent. solution should be used."

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DR. ADAMS: As there is no further business the meeting stands adjourned.

SECTION ON SANITARY SCIENCE AND POLICE

Monday Afternoon, September 1, 1913

Third Vice-President H. Jensen, Presiding
Charles H. Higgins, Director

The Chairman: Gentlemen, please come to order. The first paper to be presented this afternoon is by Doctors Mohler and Eichhorn, entitled "Immunization Tests with Glanders Vaccine." The paper will be read by Dr. Eichhorn.

IMMUNIZATION TESTS WITH GLANDERS VACCINE

By John R. Mohler and Adolph Eichhorn
Washington, D. C.

Among the diseases of horses with which the veterinary authorities are concerned, glanders is probably the most important, and unless strict measures for its control are enforced the tendency of the disease is to spread more or less rapidly. This fact is due to the character of the disease, to the prevailing methods of caring for horses and, probably more important than all, to the frequent latent existence of the disease in apparently healthy animals. The destruction of all infected animals has been accepted as a matter of course in all civilized countries, and, owing to the dangerous character of the disease and the possibility of transmission to man, this action appears to be the sanest and most reasonable procedure in its control. On the other hand, the possibility of a method of immunization of healthy animals is worthy of consideration and would be of wonderful advantage.

Ever since the discovery of mallein as a diagnostic agent for glanders, experiments have been conducted by various investigators relative to its immunizing and curative value. Many favorable reports have been made by veterinarians of the results obtained. On the contrary, others appear to have had no satisfaction from its use.

Since it has been proved that glanders cases may recover, it is rather difficult to establish the value of the immunizing agents as to their action on the disease. Fortunately, we now possess means by which the presence of immune bodies can be demonstrated in the animal upon which attempts at immunization are made. With the serological tests at our command, we may control to some extent the action of an immunizing substance and observe how long the immune bodies are present in an animal receiving immunization treatment. It is unfortunate, however, that the demonstration of immune bodies does not indicate the degree of immunity in the animals.

We may obtain in glanders immunization an agglutination value of 1 to 5000 or over, or a complement-fixation with 0.02 of a c.c. of serum, which may continue for a period of several months; yet this same animal which apparently is supplied with a great amount of immune bodies can be readily infected with glanders bacilli. Thus, in tests undertaken for establishing the degree of immunity against glanders in the horse, it is necessary to expose the injected animals to an infection such as occurs under natural conditions. Observations of such animals as to the clinical appearance of the disease and periodical ophthalmic tests with mallein are the methods by which the most accurate results of the immunization tests can be obtained. Serum tests in these cases are of little value, as they invariably demonstrate immune bodies or antibodies in the immunized animals, and since even small quantities of mallein injected into a horse are sufficient to produce antibodies which remain for three or four weeks.

Curative results from mallein were reported by Leclainche, Hueppe, Nocard, Johne and Wladimiroff, while its immunizing value against glanders was studied by Schindelka, McFadyean and Semmer; but the results were unsatisfactory. Taking into consideration the bibliography at our command, and drawing conclusions from the results obtained, it appears that mallein possesses very little immunizing value and no great benefit can be expected from its use as a curative agent.

Other investigators attempted to immunize horses and other animals against glanders by the use of killed glanders bacilli, and the literature contains some favorable results from this method of immunization. The preparations which were employed for this purpose were in most instances suspensions of glanders bacilli killed by heat. Of the various products which have been prepared and are at the present time used, to a limited extent, for the immunization of glanders, "Farase," so termed by Levy, Blumenthal and Marxer, gives apparently the best results. It is prepared by killing glanders bacilli with 80 per cent. glycerin or 10 per cent. urea. The bacilli are then dried and the substance is used in that condition for the immunization and does not contain living bacteria. Favorable results were obtained with Farase by Machodin and Bautz, and Dediulin. The results of Dediulin are probably the most remarkable, since he reports that, on an estate where previous to immunization 276 glandered animals had been destroyed, he injected 303 animals, and after one year and four months not a single case of glanders developed, although in the meanwhile fourteen cases of glanders developed among 300 non-immunized animals.

Machodin and Bautz subjected Farase to various tests to establish its immunizing value. Their results on guinea-pigs, cats and horses were very satisfactory. Guinea-pigs which were given two injections of Farase resisted, six weeks later, an intraperitoneal infection with $\frac{1}{2500}$ and $\frac{1}{5000}$ mg. of glanders bacilli. Of 6 horses which received two immunizing injections of Farase, 2 were given $\frac{1}{2500}$ mg. of glanders bacilli subcutaneously, 2 received $\frac{1}{500}$ mg. of glanders bacilli per os and 2 were exposed with the other animals forty-five days after the second injection. For each of the groups one check was used.

Post-mortem examination of the check animals, four to five weeks after the infection, showed typical glanders, while the 2 immunized animals which received subcutaneous injections of glanders bacilli failed to show any lesions of the disease. No record was obtained of the 4 remaining immunized animals, as they were turned over to another laboratory for study of the duration of immunity in these horses.

One of the recent works on the immunization of glanders was published by Zurkan, who studied the formation of specific antibodies in the blood of horses under the action of glanders antigens. He concludes that of various antigens—such as Farase, killed glanders bacilli, mallein and malleo-aggressin—Farase and malleo-aggressin proved most active in the production of immune bodies. The degree of immunity in the animals was established by Zurkan from the comparative results of the serological reactions he obtained with the complement-fixation, agglutination, precipitation and opsonic tests. Since there were no practical tests made on these animals, his statement that malleo-aggressin may be used for the immunization of horses against glanders cannot be accepted as conclusive.

At the last meeting of the A. V. M. A., in Indianapolis, McKellar presented his conclusions on the protective effect of glanders vaccine.

The proportion of infections in the stables where these outbreaks occurred, as indicated by the agglutination test, is astonishing. As no mention is made in the article of the time the agglutination tests were applied subsequent to the mallein test, it suggests that the large proportion of reactors to the agglutination tests were the results of the mallein injection and not due to the presence of the infection. If this be true, then the effect of the vaccine remains indefinite and the control of the disease must be accredited to the other precautions which were observed. At best it will require several years before the value of any method of immunization can be satisfactorily established.

The New York City Board of Health has been conducting immunizing experiments with a vaccine prepared in their laboratory, consisting of a suspension of dried glanders bacilli. Each c.c. of the suspension contains 2 mg. of dried bacilli. Through the courtesy of Dr. William H. Park, director of the laboratory, a sufficient quantity of such vaccine was obtained for conducting a series of investigations relative to the possibility of conferring immunity to animals injected with this vaccine. The experiments were made on guinea-pigs and on horses. 20 guinea-pigs about 600 grams in weight were divided into four groups, 4 pigs of each group receiving three immunizing injections of a definite amount of vaccine at intervals of one week. The size of the doses and other details are graphically presented in Table I. After the conclusion of these vaccinations one pig from each group was subjected to infection with suspensions of glanders bacilli. These injections with infectious material were administered at various intervals. In all instances the same strain of glanders bacilli was used for the infections.

TABLE I.—Immunization Tests with Glanders Vaccine in Guinea-pigs.

Group.	Number guinea-pigs.	Date of first vaccination.[1]	Amounts injected.[2]			Date of injection.	Amount of injection.[3]	Date of death.	Bacteriological results.
1	1	May 19, 1913	.1 c.c.	.3 c.c.	.5 c.c.	June 10, 1913	Dilution of bacilli in 10 c.c. bouillon	Died June 28, 1913	B. mallei recovered.
	2	May 19, 1913	.1 c.c.	.3 c.c.	.5 c.c.	June 17, 1913	Dilution of bacilli in 10 c.c. bouillon	Died July 14, 1913	B. mallei recovered.
	3	May 19, 1913	.1 c.c.	.3 c.c.	.5 c.c.	June 24, 1913	Dilution of bacilli in 20 c.c. bouillon	Died July 28, 1913	B. mallei recovered.
	4	May 19, 1913	.1 c.c.	.3 c.c.	.5 c.c.	July 1, 1913	Dilution of bacilli in 20 c.c. bouillon	Killed July 20, 1913, on account of extensive suppurating abscesses	B. mallei recovered.
2	1	May 19, 1913	.3 c.c.	.5 c.c.	.8 c.c.	June 10, 1913	Dilution of bacilli in 10 c.c. bouillon	Died July 12, 1913	B. mallei recovered.
	2	May 19, 1913	.3 c.c.	.5 c.c.	.8 c.c.	June 17, 1913	Dilution of bacilli in 10 c.c. bouillon	Killed July 16, 1913, on account of extensive suppurating abscesses	B. mallei recovered.
	3	May 19, 1913	.3 c.c.	.5 c.c.	.8 c.c.	June 24, 1913	Dilution of bacilli in 20 c.c. bouillon	Killed August 20, 1913	B. mallei recovered.
	4	May 19, 1913	.3 c.c.	.5 c.c.	.8 c.c.	July 1, 1913	Dilution of bacilli in 20 c.c. bouillon	Died August 13, 1913	B. mallei recovered.
3	1	May 19, 1913	.6 c.c.	.9 c.c.	1.2 c.c.	June 10, 1913	Dilution of bacilli in 10 c.c. bouillon	Died July 16, 1913	B. mallei recovered.
	2	May 19, 1913	.6 c.c.	.9 c.c.	1.2 c.c.	June 17, 1913	Dilution of bacilli in 10 c.c. bouillon	Died July 24, 1913	B. mallei recovered.
	3	May 19, 1913	.6 c.c.	.9 c.c.	1.2 c.c.	June 24, 1913	Dilution of bacilli in 20 c.c. bouillon	Killed July 16, 1913, on account of extensive suppurating abscesses	B. mallei recovered.
	4	May 19, 1913	.6 c.c.	.9 c.c.	1.2 c.c.	July 1, 1913	Dilution of bacilli in 20 c.c. bouillon	Killed July 26, 1913, on account of extensive suppurating abscesses	B. mallei recovered.
4	1	May 19, 1913	1.0 c.c.	1.5 c.c.	2.0 c.c.	June 10, 1913	Dilution of bacilli in 10 c.c. bouillon	Died July 5, 1913	B. mallei recovered.
	2	May 19, 1913	1.0 c.c.	1.5 c.c.	2.0 c.c.	June 17, 1913	Dilution of bacilli in 10 c.c. bouillon	Killed July 16, 1913, on account of extensive suppurating abscesses	B. mallei recovered.
	3	May 19, 1913	1.0 c.c.	1.5 c.c.	2.0 c.c.	June 24, 1913	Dilution of bacilli in 20 c.c. bouillon	Died August 2, 1913	B. mallei recovered.
	4	May 19, 1913	1.0 c.c.	1.5 c.c.	2.0 c.c.	July 1, 1913	Dilution of bacilli in 20 c.c. bouillon	Killed August 20, 1913, on account of extensive suppurating abscesses	B. mallei recovered.
Check	1	Not vaccinated	......	......	......	June 10, 1913	Dilution of bacilli in 10 c.c bouillon	Died July 8, 1913	B. mallei recovered.
Check	2	Not vaccinated	......	......	......	June 17, 1913	Dilution of bacilli in 10 c.c. bouillon	Killed June 28, 1913, on account of extensive suppurating abscesses	B. mallei recovered.
Check	3	Not vaccinated	......	......	......	June 24, 1913	Dilution of bacilli in 20 c.c bouillon	Killed July 5, 1913, on account of extensive suppurating abscesses	B. mallei recovered.
Check	4	Not vaccinated	......	......	......	July 1, 1913	Dilution of bacilli in 20 c.c bouillon	Died August 3, 1913	B. mallei recovered.

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[1] The immunizing injections were given at seven-day intervals.

[2] All injections were made subcutaneously.

[3] 0.5 c.c. of suspension in 10 c.c. or 20 c.c. bouillon containing 1 loopful of surface growth from agar culture.

The fifth pig in each group was not vaccinated, but served as a check, receiving only a corresponding quantity of glanders bacilli. The results of the tests in guinea-pigs show that there was not a sufficient increased resistance among the vaccinated guinea-pigs to warrant any hopes of successful immunization by this method. It is to be regretted that in the infection of these pigs, probably too large a quantity of glanders bacilli was used. On the other hand, it would appear that if there had been any appreciable immunity present in the vaccinated guinea-pigs they would have manifested it by a greater resistance against the infection.

In the experiments conducted on horses, 17 animals were used which were purchased on the open market. Most of the animals were aged, but otherwise in fair condition. All horses were subjected to the agglutination, complement-fixation and the ophthalmic mallein tests prior to the vaccination. All of the horses proved free from glanders on all of these tests. Since the amount of vaccine to be injected for immunizing purposes has not been established, it was deemed advisable to employ varying quantities for the injections in the different horses, and in order to determine the resistance of the animals against infection during and after the vaccination they were subjected to exposure at different times during the investigation.

The smallest amount of the suspension used for the vaccination was the quantity recommended by the New York City Board of Health, viz., 1, 3, and 5 c.c. per injection, while the largest amount any of the horses received was 4, 8, and 12 c.c. respectively. Two of the vaccinated horses received an infection on the nasal mucosa with glanders bacilli, taken up on the end of a platinum loop, one week after the last vaccination. Both of these horses promptly developed glanders, and one of them (No. 102) died of an acute form of the disease twenty-one days after the infection. Thus there appeared to be no resistance, or at least no increased resistance, against artificial infection.

To establish the resistance of the vaccinated animals against contact infection a corral was built where all the animals, including two artificially infected glanders cases, were kept. They were fed in common feed-boxes and were watered from a common trough. Only one hayrack was used for all animals. Simultaneously with this exposure a stable with three stalls was likewise used for exposing the horses. The construction of the stalls in this stable was such that the animal in the centre could reach to the feed-boxes of either of the horses in the side stalls. The horse placed in the centre was a good discharging case of clinical glanders, whereas the horses placed in the side stalls were either two immunized animals or two controls, all of which were given one week's exposure with this infected horse. This was accomplished by changing the horses in the two side stalls every week and bringing in two others from the corral, so as to make the exposure as uniform as possible in all animals, including the checks. The conditions of exposure were apparently severe, yet they did not exceed the exposure which occurs in the stables of large cities, where the sanitary conditions are very poor and where poor light and ventilation afford a splendid opportunity for the propagation of the disease. In fact, the exposure in the corral was rather slight, since the sunlight no doubt had a destructive effect on the infection.

All animals were subjected periodically to clinical examinations and only one of the vaccinated horses has developed signs of the disease up to the present time, although some of them have been exposed since May 16. Horse No. 99, which received four immunizing injections and was exposed to a discharging case of glanders in the stable, died fifteen days after the exposure from acute bronchopneumonia malleosa.

In order to determine whether any of the vaccinated horses were infected with the latent form of the disease, all were subjected, July 23, to the ophthalmic test. This gave surprising results: Two of the vaccinated animals gave a marked reaction (P+++); a similar reaction was also obtained in the affected horses used for exposure; while of the two check animals, which were not vaccinated but had been exposed to a similar extent as the vaccinated animals, only one responded to the eye test; the other check animal failed to give any reaction. One month later all horses in the experiment were again subjected to the ophthalmic test. The results were the same as on the previous test. At this time it was noted that the intensity of the reaction was not as pronounced as in the first test. The inflammation and amount of purulent discharge were somewhat less than in the previous test. This observation coincides with that of Meyer, who states that after several eye tests in positive cases of glanders the degree of the reaction becomes less distinct.

The detailed account of the results of the immunizing tests in horses is given in Table II.

TABLE II.—Immunization Tests with Glanders Vaccine in Horses.

Horse No.	Amounts and dates of vaccination.				Date of exposure.	Ophthalmic tests.		Post-mortem.	Remarks.
	1	2	3	4		July 23.	August 23.		
99	1 c.c. Mar. 28, 1913	3 c.c. April 4, 1913	5 c.c. April 11, 1913	8 c.c. April 25, 1913	May 16, 1913	......	......	Acute glanders	Died May 31, 1913.
107	1 c.c. Mar. 28, 1913	3 c.c. April 4, 1913	......	......	......	......	......	Impaction	Died April 21, 1913.
86	1 c.c. Mar. 28, 1913	3 c.c. April 4, 1913	5 c.c. April 11, 1913	8 c.c. April 25, 1913	May 16, 1913	......	......	......	Still under observation.
102	1 c.c. Mar. 28, 1913	3 c.c. April 4, 1913	5 c.c. April 11, 1913	8 c.c.	Infected April 18 with B. mallei	......	......	Acute glanders	Died May 9, 1913.
111	1 c.c. Mar. 28, 1913	3 c.c. April 4, 1913	5 c.c. April 11, 1913	......	Infected April 18 with B. mallei	P +++	P ++	......	First clinical symptoms of glanders appeared April 23, 1913; still under observation.
110	1 c.c. Mar. 28, 1913	3 c.c. April 4, 1913	5 c.c. April 11, 1913	8 c.c. April 25, 1913	May 16, 1913	—	—	Showed no lesions of glanders	Killed August 20, 1913; no clinical signs of glanders.
105	1 c.c. Mar. 28, 1913	3 c.c. April 4, 1913	5 c.c. April 11, 1913	8 c.c. April 25, 1913	May 16, 1913	P +++	P ++	Lungs showed typical glanders nodules.	Killed August 20, 1913; no clinical signs of glanders.
117	2 c.c. May 2, 1913	4 c.c. May 9, 1913	6 c.c. May 16, 1913	......	May 16, 1913	—	—	......	Still under observation.
118	2 c.c. May 2, 1913	4 c.c. May 9, 1913	8 c.c. May 16, 1913	......	May 21, 1913	P +++	P ++	Lungs showed numerous glanders nodules	Killed August 20, 1913; no clinical signs of glanders.
119	2 c.c. May 2. 1913	4 c.c. May 9, 1913	8 c.c. May 16, 1913	......	May 28, 1913	—	—	......	Still under observation.
120	2 c.c. May 2, 1913	4 c.c. May 9, 1913	8 c.c. May 16, 1913	......	May 21, 1913	—	—	Showed no lesions of glanders	Killed August 20, 1913; no clinical signs of glanders.
123	4 c.c. May 20, 1913	8 c.c. May 27, 1913	12 c.c. June 24, 1913	......	June 20, 1913	—	—	......	Still under observation.
124	4 c.c. May 20, 1913	8 c.c. May 27, 1913	12 c.c. June 24, 1913	......	June 20, 1913	—	—	Showed no lesions of glanders	Killed August 20, 1913; no clinical signs of glanders.
94	Not vaccinated				May 16, 1913	P +	P +	Lungs showed numerous typical glanders nodules	Killed August 20, 1913; no clinical signs of glanders.
121	Not vaccinated		......	......	May 20, 1913	—	—	......	Still under observation.
82	Infected Mar. 21, 1913, and used for exposure to other horses				......	P +++	P +++	......	First clinical symptoms of glanders appeared March 26, and continued to progress.
122	Infected May 22, 1913, and used for exposure to other horses				......	P +++	P ++	......	First clinical symptoms of glanders appeared May 26, 1913, and continued to progress.

In order to study the effect of the immunizing injections on the serum tests, the blood of the horses in this experiment was subjected to the agglutination and complement-fixation tests from the time of the first injection until the conclusion of the work. It was found that the agglutination value of the serum of the vaccinated horses as a rule increased from the third day after the first vaccination and continued to rise for a time. A decrease was again noted from two to four weeks after the last vaccination and appeared practically normal after six weeks to two months. A complement-fixation with the sera of the vaccinated horses was obtained from seven to nine days after the first vaccination and they continued to give positive fixations from two to three months after the last vaccination.

These serological results appeared only in the animals which gave no reaction to the ophthalmic test, while the blood of those vaccinated horses which gave a positive reaction to the eye test continued to give a positive fixation until they had been destroyed and proved to be affected with the disease. The same condition was observed in the animals which had been artificially infected with glanders.

The serological results from these investigations appear to have a great significance with reference to the immunity produced by the injection of dead glanders bacilli. The fact that the demonstration of the presence of immune bodies in the vaccinated horses ceased entirely in two or three months from the last vaccination would indicate that after the lapse of such a time the animals have very little or no immunity against the disease. This is further substantiated also by the agglutination value of the sera returning to the normal level. As a matter of fact, previous investigations carried out by Dr. Buck, of this laboratory, showed that one or two subcutaneous injections of mallein will give a complement-fixation which may last from one to two months. The agglutination value of the serum of such animals is also markedly influenced by subcutaneous malleinization. The serum reaction of horses following the subcutaneous injections of mallein is given in detail in Table III. Thus it seems that a mallein injection has almost the same action on the production of immune bodies in a horse as killed glanders bacilli. Table IV indicates the results obtained with the agglutination and complement-fixation tests in the animals used in this investigation.

TABLE III.—Serum Reactions in Normal Horses Following the Subcutaneous Injection of 1 c.c. of Mallein.

		Jan. 31, 3 days.	Feb. 3, 6 days.	Feb. 6, 9 days.	Feb. 9, 12 days	Feb. 13, 16 days.	Feb. 17, 20 days.	Feb. 20, 23 days.	Feb. 23, 26 days.	Feb. 27, 30 days.	Mar. 3, 34 days.	Mar. 6, 37 days.	Mar. 10, 41 days.	Mar. 13, 44 days.	Mar. 17, 48 days.	Mar. 21, 52 days.	Mar. 24, 55 days.
96	Comp. fixation	.1 .2 — —	.1 .2 — —	.1 .2 — Sl+	.1 .2 — Sl+	.1 .2 Sl+ ½+	.1 .2 Sl+ Sl +	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —
	Agglutination	1:500 —	1:800	1:800	1:800	1:800	1:500	1:600	1:500	1:500 —	1:500—	1:500 —	1:500 —	1:500 —	1:500 —	1:500 —	1:500 —
98	Comp. fixation	.1 .2 — —	.1 .2 — —	.1 .2 — Sl+	.1 .2 ¾+ +	.1 .2 + +	.1 .2 + +	.1 .2 ¾+ ¾+	.1 .2 ¾+ ¾+	.1 .2 Sl+ ½+	.1 .2 Sl+ ½+	.1 .2 Sl+ ½+	.1 .2 Sl+ ½+	.1 .2 Sl+ Sl+	.1 .2 Sl+ Sl+	.1 .2 — —	.1 2. — —
	Agglutination	1:800	1:2000	1:1500	1:1500	1:2000	1:2000	1:1500	1:2000	1:1500	1:1000	1:1000	1:1100	1:800	1:800	1:500 —	1:500 —
102	Comp. fixation	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — Sl+	.1 .2 Sl+ ½+	.1 .2 Sl+ ½+	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —
	Agglutination	1:600	1:1000	1:1000	1:1000	1:1000	1:800	1:1000	1:800	1:800	1:600	1:800	1:600	1:600	1:500 —	1:500 —	1:500 —
103	Comp. fixation	.1 .2 — —	.1 .2 — —	.1 .2 + +	.1 .2 + +	.1 .2 + +	.1 .2 + +	.1 .2 ¾+ ¾+	.1 .2 ¾+ ¾+	.1 .2 ½+ ¾+	.1. .2 ½+ ¾+	.1 .2 ½+ ¾+	.1 .2 Sl+ ½+	.1 .2 Sl+ +½	.1 .2 Sl+ Sl+	.1 .2 — Sl+	.1 .2 — —
	Agglutination	1:500 —	1:800	1:1000	1:1000	1:800	1:800	1:600	1:500	1:500 —	1:500 —	1:500 —	1:500 —	1:500 —	1:500 —	1:500 —	1:500 —
107	Comp. fixation	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —
	Agglutination	1:800	1:100	1:1500	1:1500	1:2000	1:1500	1:1500	1:1000	1:1000	1:1000	1:1000	1:1000	1:800	1:800	1:800	1:500 —

Horses 96, 98, and 103 Received a Second Injection of 1 c.c. of Mallein March 28, 1913.

		Mar. 31, 3 days.	Apr. 3, 6 days.	Apr. 7, 10 days.	Apr. 10, 13 days.	Apr. 14, 17 days.	Apr. 17, 20 days.	Apr. 21, 24 days.	Apr. 24, 27 days.	Apr. 28, 31 days.	May 1, 34 days.	May 5, 38 days.	May 8, 41 days.	May 12, 45 days.	May 15, 48 days.	May 19, 52 days.	May 22, 55 days.	June 2, 67 days.
96	Comp. fixation	.1 .2 — —	.1 .2 Sl+ Sl+	.1 .2 Sl+ Sl+	.1 .2 ½+ ½+	.1 .2 Sl+ Sl+	.1 .2 Sl+ Sl+	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —	.1 .2 — —
	Agglutination	1:500 —	1:500 —	1:600	1:800	1:500 —	1:500 —	1:600	1:500 —	1:1500 —	1:500 —	1:500 —	1:500 —	1:500 —	1:500 —	1:500 —	1:500 —	1:500 —
98	Comp. fixation	.1 .2 — —	.1 .2 + +	.1 .2 + +	.1 .2 + +	.1 .2 + +	.1 .2 + +	.1 .2 + +	.1 .2 + +	.1 .2 + +	.1 .2 + +	.1 .2 + +	.1 .2 ½+ ¾+	.1 .2 ½+ ¾+	.1 .2 ½+ ¾+	.1 .2 ½+ ¾+	.1 .2 ½+ ½+	.1 .2 — —
	Agglutination	1:800	1:1500	1:2000	1:2000	1:1500	1-1500	1:1500	1:1000	:800	1:600	1:600	1:600	1:600	1:600	1:600	1:500 —	1:500 —
103	Comp. fixation	.1 .2 — —	.1 .2 ½+ +	.1 .2 + +	.1 .2 + +	.1 .2 + +	.1 .2 + +	.1 .2 + +	.1 .2 + +	.1 .2 + +	.1 .2 + +	.1 .2 + +	.1 .2 ½+ ¾+	.1 .2 ½+ ¾+	.1 .2 ½+ ¾+	.1 .2 ½+ ½+	.1 .2 ½+ ½+	.1 .2 — —
	Agglutination	1:600	1:1500	1:2000	1:2000	1:2000	1:2000	1:2000	1:1000	1:1000	1:800	1:800	1:800	1:800	1:800	1:600	1:500 —	1:500 —

Quantities of serum employed in complement-fixation tests, 0.1 c.c. and 0.2 c.c.
Fractions represent the approximate degree of fixation as compared with complete fixation; Sl + indicates slight fixation.
Six dilutions of sera employed in agglutination test: 1:500; 1:600, 1:800, 1:1000, 1:1500 and 1:2000.

TABLE IV.—Serum Reactions in Horses Vaccinated against Glanders.

Horse No.	Vaccination. period.	Agglutination.								Complement fixation with 0.1 and 0.2 c.c. of serum.								Remarks.
		During vaccination period.			After vaccination.					During vaccination period.				After vaccination.				
		At first vacci-nation.	2d week.	4th week.	2d week.	4th week.	6th week.	8th week.	12th week.	At first vacci-nation.	2d week.	4th week.	3d week.	6th week.	8th week.	10th week.	12th week.	
99	Mar 28, 1913 to April 25, 1913	1:400 –	1:2000 +	1:2000 +	1:2000 +	....	....	....	....	–	+	+	+	..	..	..	..	Died May 31 from acute glanders and influenza.
86	Mar. 28, 1913 to April 25, 1913	1:400 –	1:2000 +	1:2000 +	1:1500	1:1000	1:800	1:400 –	1:400 –	–	+	+	–	–	–	–	–	
110	Mar. 28, 1913 to April 25, 1913	1:400 –	1:1500	1:2000 +	1:2000 +	1:1000	1:400 –	1:400 –	1:400 –	–	+	+	+	+	–	–	–	Still under observation.
105	Mar. 28, 1913 to April 25, 1913	1:400	1:2000	1:2000 +	1:2000 +	1:1500	1:800	1:2000	1:2000 +	–	+	+	+	+	+	+	+	Postmortem showed pulmonary glanders.
117	May 2, 1913 to May 16, 1913	1:400 –	1:2000	1:2000 +	1:2000 +	1:1000	1:400	1:400 –	1:400 –	–	+	+	+	–	–	–	–	Still under observation.
118	May 2, 1913 to May 16, 1913	1:400	1:2000	1:2000 +	1:1500	1:1500	1:800	1:1500	1:2000	–	+	+	+	+	+	+	+	Postmortem showed pulmonary glanders.
119	May 2, 1913 to May 16, 1913	1:400 –	1:1500	1:2000 +	1:1500	1:1000	1:400	1:400 –	1:400 –	–	+	+	+	+	+	+	–	Still under observation.
120	May 2, 1913 to May 16, 1913	1:400	1:2000	1:2000 +	1:2000 +	1:1500	1:800	1:400	1:400	–	+	+	+	+	–	–	–	Postmortem showed no signs of glanders.
123	May 20, 1913 to June 24, 1913	1:400	1:2000	1:2000 +	1:2000	1:1500	1:1000	....	1:400	–	+	+	+	+	..	..	–	Still under observation.
124	May 20, 1913 to June 24, 1913	1:400	1:1500	1:2000	1:2000	1:1500	1:800	....	1:400	–	+	+	+	–	..	..	–	Postmortem showed no signs of glanders.
		Before exposure	After exposure							Before exposure	After exposure							
94	Unvaccinated check infected by exposure	1:400 –	1:400	1:800	1:1500	1:2000	1:1500	1:800	1:1000	–	–	+	+	+	+	+	+	Postmortem showed pulmonary glanders.
121	Unvaccinated check remained healthy	1:400	1:400	1:400	1:400	1:400	1:400	1:400	1:400	–	–	–	–	–	–	–	–	Still under observation.

On August 20 two vaccinated horses, as well as one check animal which gave positive results to the eye test, were destroyed, and in all three animals marked pulmonary glanders was observed. Horse No. 105 showed the presence of glanders nodules in the lungs in very great numbers, some of which were of the size of a walnut. In the two other cases, while the nodules were very numerous and from their appearance appeared to be active, they were of smaller sizes, ranging from a pinhead to the size of a pea. Horses Nos. 110, 120 and 124 were killed on the same day, although they had failed to show any indication of glanders by the eye test, which was also substantiated by the complement-fixation test with the blood of these animals. Post-mortem examination showed no signs of glanders in these animals.

All the other animals used in these experiments are still under observation, as it is deemed advisable to give them additional exposure in order to determine whether they possess an immunity to the disease.

The results obtained by these investigations appear to be sufficient to demonstrate the unsatisfactory results of this method of immunization. Of the immunized animals, three contracted the disease from natural exposure, which is a large proportion when it is considered that all animals were aged and kept most of the time during the exposure out of doors. On the other hand, the fact that of the two check animals only one contracted the disease, is additional evidence of the moderate character of the exposure, which further suggests the ineffectiveness of the immunization. In artificial infections of the vaccinated animals they showed no resistance whatsoever, as both vaccinated horses promptly developed an acute form of the disease from touching the Schneiderian membrane with a platinum loop which had been touched to a growth of glanders bacilli. Thus, for the present, it seems advisable to abstain from immunizing horses by this method, as a practice of this kind may do more harm than good. Owners having horses which are supposedly immunized would naturally become careless, thinking their animals were resistant to the disease, and thus even a better opportunity would be offered for the propagation of the disease than if the horses were not vaccinated. Furthermore, the fact that the blood of vaccinated animals cannot be utilized for serum tests for two or three months after the injections is also a great disadvantage in the eradication of the disease.

As a result of this preliminary work it appears that the control and eradication of glanders must still be dependent upon the concentration of our efforts in eliminating infected horses and the adoption of proper precautions against the introduction of infected animals into stables free from the disease. By these methods the results achieved in Germany, Austria and Canada have proved very encouraging, and, no doubt, if executed in the same spirit in this country a marked reduction in the cases of glanders would result.

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DISCUSSION

The Chairman: Gentlemen, you have listened to a very interesting paper by Dr. Eichhorn and I will bespeak for it a very free discussion.

Dr. Jones: I would like to ask Dr. Eichhorn how reliable he thinks the ophthalmic mallein test is?

The Chairman: If you will ask all the questions at this time the doctor will make his replies all at once. Any other question? Gentlemen, we want you to take hold of this meeting. A paper without any discussion is a dry matter. Let us have a free discussion. Dr. Kinsley, you have some questions to ask, and Dr. Babb.

Dr. Kinsley: I quite agree with the gentleman.

The Chairman: Perhaps Dr. Eichhorn would answer this question and then in the meantime you will think of some others.

Dr. Eichhorn: The Association has appointed a committee for establishing the most reliable tests for the diagnosis of glanders and I think it will be best to await the report of that committee which will include all the different tests, and especially which gives quite an exhaustive account of the ophthalmic test. It will be better to postpone this phase of the discussion for that meeting.

The Chairman: Perhaps that is a good idea. Gentlemen, this meeting must not drag for a minute. We must have something doing all the time.

Dr. Reichel: I would like to ask Dr. Eichhorn if all of the horses were exposed one week after the last test. The reason I ask the question is this: It is well known that after the animal has received the last dose of any vaccine or any bacterial infection its resistance to infection is really lowered for a time. This may vary, that is, it may be seven days or it may be two weeks. I would like to know whether any of the animals were exposed, say, within two weeks after the last vaccinating dose. It seems to me that has a very important bearing in trying to determine whether or not the animals were at all benefited by any of the injections.

While on my feet I wish to mention that I happened to come across an article during the past week in which two men reported on "Farase" as an immunizing agent. These two men immunized a large series of horses and afterward exposed them to infection and they failed absolutely to demonstrate any value in "Farase."

Dr. Mangan: In reference to the vaccine, that is the vaccine that Dr. Eichhorn had experience with, furnished by the Department of Health, I wish to say that I used that in clinical work and in addition checked it up with the agglutination test. In the conclusion of that work I came to the final decision that, instead of the vaccine being an immunizing agent, it was an agent that caused the development of glanders just so much quicker. If vaccine is to be of any use in the control of glanders, I came to the conclusion that the only place to use it was far away from the area of the disease. That is, after the animal is vaccinated he is in the so-called negative phase for a longer or shorter period and during that time he is more susceptible to develop the disease than a horse that had not been vaccinated. Therefore I have come to the conclusion from clinical observations that the vaccine is absolutely useless for the very reason that it will make the horse more susceptible to disease than if he had not been vaccinated at all, and Dr. Eichhorn has borne that out by his paper, and as to the amount of vaccine he injected, that is 1 to 2½ to 5, I used in doses of ¼ c.c., ½ c.c. and 1½ c.c., and I found in the course of those experiments that horses developed glanders just as quickly as when I used 1, 2½ and 5 c.c.

Dr. Eichhorn: Relative to the exposure of horses in these experiments which we conducted, we exposed the horses at variable intervals, considering of course that these animals might be more resistant at certain stages after the vaccination. So we took always two or three horses and exposed them, some two weeks after the last vaccination, some after three weeks and some after four weeks following the last vaccination, but apparently it had no effect on the results, as the horses which contracted the disease were those which were exposed one week and also that were exposed three weeks after the last vaccination. No doubt there is a negative phase developed after vaccination, and that has to be considered also, but it was not our aim to study that part of the work, but to vaccinate just as in ordinary practice to see whether the horses could contract the disease or whether they acquired certain resistance or not; that was the main object of the experiment.

Dr. De Vine: I would like to ask Dr. Eichhorn, along that same question, how long from the time of treatment of these horses were they destroyed and posted?

Dr. Eichhorn: This has been indicated in the paper—the table which will accompany this article contains accurate data on that—I think some of these horses were destroyed about two months after the last vaccination and some as long as three months. We haven't destroyed all the horses; we have still on hand eight horses which were vaccinated and we will continue to observe them and do further work to establish whether they have a certain amount of immunity or not.

Dr. MacKellar: I have taken great pleasure in listening to Dr. Eichhorn's paper, which was very instructive. And if the short article I read at the Indianapolis meeting has brought out this splendid result and the splendid findings that he has made, I think the effort was not in vain. I have always considered that we got more or less immunizing from the use of glanders vaccine and we took up the experimental work on it at the instigation of Dr. Kingston, of the New York Health Department. He was the one who advocated its use here at the beginning and we apparently in everyday work got good results. As I cited in my paper of last year, we apparently cleaned up some stables and they apparently have stayed clean with the exception of one of two cases where new horses have been introduced. But, of course, we can't refute the findings that Dr. Eichhorn has presented, and as I said before I take great pleasure in thanking Dr. Eichhorn for his very splendid article.

The Chairman: I hate to close a discussion of such a valuable paper, but if you don't speak up we are going to close.

Dr. De Vine: With your permission I would like to speak again. Those who are engaged in glanders work know the difficulties that have arisen after the use of vaccine and mallein on the sera test, and I think the men engaged in the control of glanders work throughout the state ought to discuss that problem here. I believe we could settle that matter at this time; I think there is information enough now to know whether the use of mallein and vaccine as used under our present procedure is a mistake.

Dr. Ward: I believe there was a committee appointed to report on that. I think when they present their report it will be time for us who are interested to discuss it, and there are a great many of us who will take the opportunity of discussing it, especially the various methods of diagnosing glanders.

Dr. Reichel: A wrong impression must have been sent forth. If it is the glanders committee or the committee on the diagnosis of glanders, it is hardly proper to go into it. The committee, as I remember, was instructed to recommend modern methods of diagnosis, and I doubt if they can do anything with the treatment of glanders.

Dr. Ward: I am glad Dr. Reichel made that explanation because a good many of us had the idea that the committee would recommend some special method of controlling it.

The Chairman: Inasmuch as Dr. Reichel is on that committee he ought to know.

Dr. Reichel: As I said, the efforts of the committee are being confined entirely to the methods of diagnosis and not treatment.

The Chairman: Hence I think it will be a mighty good plan to discuss it now.

Dr. Gibson: I am glad to know one member of this committee is now near me and I want that committee report to tell me for one how to pass upon a South Dakota broncho. Don't forget that. Now the chairman is talking about utilizing the time to advantage. Are you doing anything else but wasting time when you talk about treating glanders?

Dr. Atwood: In the state of Connecticut we have in the control of glanders, under the Act of 1905, the phrase "physical symptoms." I would like to ask the Doctor if that will be covered by the investigation in his report; that is, how far the test would apply to the physical symptoms of glanders. I have a report from Dr. Conn, dated August 9, on a case I treated a year ago. That horse had given positive reaction to the agglutination test and to the fixation test five times at the Bureau of Animal Industry. I asked to have that case arbitrated and the point raised was that our law read physical symptoms of glanders, and I mentioned the point that I considered five positive reactions to be sufficient, and that the agglutination and the complement-fixation test I should consider a part of physical symptoms. I would like to know how far that would apply.

Dr. Eichhorn: Of the physical symptoms we only consider those manifestations on the animal which are detected by an ordinary clinical examination, such as the discharge, the swelling of the glands, and so on. I think if you get any of these physical signs, together with the positive findings of the serum test, it is sufficient proof of the presence of glanders in such an animal.

Dr. Ackerman: I simply want to emphasize two of the conditions that Dr. Eichhorn brought out in his paper: One is the administration of vaccine interfering with our sera test, which is used so often in the spirit of hiding the disease, in other words plugging the horses so that the officials from state and municipal departments might be baffled as to the true results. I therefore consider that the vaccine is a very dangerous article. The other point that Dr. Eichhorn brought up was a good one. He didn't emphasize it quite enough. And that is the vaccination of horses gives the owner the idea that the horses are protected, and tends to produce carelessness in the owner and his help, and in that way largely increases the danger from glanders. I just wanted to emphasize those two conditions.

The Chairman: Very good points they are. Is there anyone else desiring to speak on this subject? If not we will close the discussion and go on to the next paper, "General Education in Regard to Glanders and Public Drinking Fountains," by Dr. B. T. Woodward, Washington, D. C.

GENERAL EDUCATION IN REGARD TO GLANDERS AND PUBLIC DRINKING FOUNTAINS

By B. T. Woodward
Washington, D. C.

Glanders is a subject of ever-active interest to the veterinary profession, and many papers upon glanders are written and discussed by its members.

An important adjunct, it would seem, is a general education of the public, and especially of representatives of humane associations and of the police force of the cities and towns to which are assigned the duties of preventing cruelty to animals. The American Humane Association recognizes the importance of this aspect of the glanders problem, and upon request the writer presented a paper upon this subject at the thirty-sixth annual meeting of that association, held in 1912.

An intelligent understanding among horseowners and the special classes of people already mentioned would assuredly be of great benefit to the live-stock authorities in controlling glanders and would lead to greater harmony in the enforcement of necessary legislation.

This paper does not purport to contain new information for the veterinarian, but endeavors to present the subject of glanders for the consideration of the people who are interested in horses and their welfare. The layman should understand that up to a comparatively recent time glanders and farcy were considered to be two distinct diseases, and that we now recognize them as a single disease, known as glanders, of which farcy is but the designation of the skin symptoms.

Glanders is a dangerous communicable disease of horses, asses and mules, prevailing in various degrees in the majority of the countries of the world. It is probable that no state of these United States is entirely free from the disease, and the greatest number of its victims are claimed in the cities, rather than in country districts.

Although glanders shows such a marked predilection for equines, it is readily communicated to man, dogs, cats, rabbits and guinea-pigs. Fortunately, however, it is practically impossible for cattle or chickens to contract the disease, and it is rare among sheep and goats.

It is one of the earliest recognized diseases, for Hippocrates, about 450 B.C., and his follower, Aristotle, gave it a distinct place in their writings. From the fourth century to our era it has appeared in veterinary writings, with a recognition of its contagiousness, which has been so well and frequently demonstrated by the repeated outbreaks in the cavalry of European countries and its appearance in previously free localities following the invasions of war and the extension of commerce.

It awaited our present generation, however, to discover the cause of the disease, and in 1882 Lœffler and Schuetz, in Germany, isolated the specific germ, which they described and named Bacillus mallei. We should realize, then, that no case of glanders exists or can be contracted unless the affected animal has come in contact with and harbors this one distinct form of germ life, the Bacillus mallei.

This organism is found principally in the nasal discharges, the pus exuding from farcy buds, and in the saliva and manure. From these sources other materials are infected by contact, making them secondary carriers of glanders. Among the secondary carriers for the dissemination of glanders which are thus produced there may be mentioned the public or common watering-troughs, mangers, nosebags, harness, currycombs and brushes, stable attendants, wagons, public hitching-sheds and posts, blacksmith shops, and access to manure piles.

The factor of greatest importance is the direct contact of healthy horses with glandered horses affected with the disease in an acute form. The contagion is in its most virulent form in acute cases, and the infected discharges invariably produce glanders when inoculated into animals which are susceptible.

The discharges from old chronic or semi-latent cases are not nearly so active and dangerous, but they should never be overlooked as an important source for the dissemination of the disease.

Having gained entrance into the body, variable periods extending from a few days to years may elapse before the appearance of lesions of the disease. Experimental inoculations have, however, demonstrated by post-mortem examination that internal lesions have developed in from one to three weeks after inoculation.

Workers in humane societies and others associated with horse welfare should have a general knowledge of the visible symptoms which are presented by glanders during its development. Through this knowledge they will in many instances be able to diagnose clinical cases of glanders as they appear among horses upon the street, in public sale stables and other places, and thus be very valuable aids in determining centers of infection and coöperating with health officials in eradicating the disease.

Glanders develops more rapidly and more frequently in the acute form in young horses than in old. The rate of development depends largely upon the age of the horse, its general vital condition, the character of food and work, and the appearance of general fevered conditions or local injury.

A well-fed horse subjected to work which never exhausts it may be affected with latent glanders for years, showing no symptoms which even point to suspicion. The first symptom to make its appearance is not always the same, and we must therefore watch for the development of any of the symptoms of glanders. A leg, usually the hindleg, may suddenly become swollen, and this swelling is usually followed by the appearance of what are termed farcy buds or buttons.

The farcy bud is a lump varying in size from a bullet to a walnut. It is first felt or seen beneath the skin, which structure it will involve, causing the death of the part immediately over the bud. An ulcer is then formed with a dirty gray appearing bottom, surrounded by ragged overhanging edges of skin. From this ulcer there is a discharge the important feature of which is a consistency such as the white of an egg possesses, combined with a color simulating olive oil. It is very tenacious, and adheres to the edges of the ulcer, over which it gradually forms a scab, which becomes thicker and thicker until it drops off and is replaced by the same process. Some of the discharge drips downward and is found adhering tightly to the hair. The ulcer may leave a permanent scar.

The presence of a discharge from the nostrils should always be regarded with suspicion and lead to a careful examination. The character of the discharge is similar to that from the farcy bud, and is characteristic in its adherence to the wings of the nostril. The lining membranes of the nostrils frequently show small nodules, which break down with the formation of deep ulcers, the bottoms of which have the same general appearance as the ulcer of farcy. When close together these ulcers may coalesce and gnaw their way entirely through the septum between the nostrils. If ulcers heal there remains almost indefinitely a typical whitish scar, star-shaped, with rays extending in various directions from its center.

The swelling of the submaxillary lymphatic glands, which are located high between the branches of the lower jaw and under the base of the tongue, is also of great importance. In glanders these glands are not sensitive, but are hard and indurated, like a bunch of hard grapes, while in the swelling of the same glands in such diseases as influenza or distemper they are sensitive, have a more doughy consistency, and tend to break down with pus formation.

Lymph vessels lying close beneath the skin may become indurated and appear as hard cords. Animals affected with these symptoms of glanders usually have slatish-gray nodules of the disease scattered throughout the substance of the lungs, and from these there is produced the symptom of coughing, which rather closely resembles the coughing of a horse affected with heaves.

The humane officer and frequently the veterinarian is unable to determine the presence of glanders in those horses where the disease is occult or latent, and where there is no external evidence of its spreading. The detection of such cases is of great importance in the suppression of epizoötics of the disease.

In the control and suppression of outbreaks ultimate eradication should be the aim. To carry out this work we need certain fundamental legislation, such as laws which compel the veterinarian or any other person to report promptly to a designated authority the presence of every single case of glanders or suspected case.

After the establishment of the diagnosis of glanders authority should exist for the slaughter of every diseased animal, either with or without reimbursement to the owner, and all infected premises should be submitted to a thorough disinfection subject to official supervision. A provisional quarantine should be established by which the identity of all animals exposed to the infection, or as we usually term them "contact horses," might be maintained so that such animals could be kept under surveillance. We should act upon the supposition that every clinical case of glanders may prove to be a center by which the remaining horses in the stable would become affected with the disease, or as a center from which it might spread indefinitely by the contamination of public water troughs.

As a result of the latest scientific investigations it is important that all contact horses be submitted to a special test for the diagnosis of possible latent cases. The complement-fixation method for the diagnosis of glanders was discovered in 1909, and has been adopted officially by Prussia, and is used by the United States Bureau of Animal Industry in official work. Its accuracy is considered to be more than 97 per cent., and when combined with what is known as the agglutination test it is practically 100 per cent. perfect in its positive diagnosis.

The use of this method requires that a small quantity of blood be removed from the horse by means of a trocar and cannula and submitted to a laboratory for examination, which requires about twenty-four hours to complete. Horseowners more readily submit their stock to this test than to the mallein test, which is less accurate and requires the stabling of the horses for at least twenty-four hours.

In some cities and countries horses which react to any of the various tests, but show no clinical evidence of glanders, are permitted upon the streets; but it has been the experience of Dr. J. G. Rutherford, formerly Veterinary Director General of Canada, under whose direction very extensive work has been conducted in the eradication of glanders from that country, and of the United States Bureau of Animal Industry, in stamping out outbreaks of the disease in Washington, D. C., that it is a dangerous plan not to destroy these reacting horses. It is therefore recommended that the policy of destroying all known cases of glanders be established.

The matter of disinfection is of great importance when we consider, as mentioned early in this paper, the methods by which the disease may be transmitted. The infected stable should first be thoroughly cleaned and then saturated with a reliable disinfectant. All of the harness which has come in contact with diseased animals should be soaked in the disinfectant, as well as currycombs and brushes. These latter in the hands of stable men are especially dangerous, as they are used promiscuously upon different horses in the stables, and should there be any abrasions of the skin the glanders bacilli upon the currycomb or brush would readily make a direct inoculation.

Precautions as outlined would probably be sufficient to stamp out an epizoötic in the country section, and in the cities also if it were not for the many public sources of infection, among which I will draw special attention to the public drinking fountain.

When a glandered horse with a nasal discharge drinks from a public drinking fountain, not infrequently some of the discharge is deposited in the water, or the animal may rub its nose against the edges of the trough, smearing the infected discharge thereon. As healthy horses drink from this contaminated source they are liable to become infected. Glandered and healthy horses drinking at the same time at the trough may come in direct contact by rubbing their noses together.

An English investigator demonstrated by laboratory experiments that the bacilli of glanders may live unharmed in ordinary London water for twenty-six days in the month of August. This is a period of the year when horses draw largely upon public drinking troughs for their supply of water, and clearly demonstrates the danger from this source in the spreading of glanders.

The veterinary sanitarian is in perfect harmony with the humane societies of the country in their efforts to supply drinking water to horses working upon the streets, but as the public fountains may be such a prominent cause of the dissemination of glanders the sanitarians desire the coöperation of the societies in the establishment of such means of watering horses as may fulfil the requirements of humanity and protect the horses from contracting disease.

Two methods for the public watering of horses may be satisfactory: First, the installation of hydrants at frequent intervals along the streets, the drivers of horses carrying with them individual water buckets. This measure, which is efficient under any conditions, has been found necessary in controlling outbreaks of glanders. In various cities the suppression of the disease has not been accomplished while the general public water troughs were maintained. The other method is the installation of fountains made of non-porous, durable material, which are specially constructed to supply constantly fresh water and carry off any contaminated substances. As a type for such trough it is recommended that it be so formed that the noses of horses cannot come in contact while drinking. The entrance of the water should be from the bottom of the trough in such manner that a constant rotary current will be produced. As the water reaches the surface it should flow over the rim of the trough throughout its entire circumference, being caught beneath in a basin which is covered to prevent it from being accessible to dogs and cats.

As some heavy material may be deposited in the water and sink to the bottom of the trough rather than pass with the current over its edges, an exit pipe from the lowest point of the base of the trough should be provided to carry away this sediment.

No public trough should be permitted to exist which is not equipped with a constant flow of water and in which the exit pipes are not of ample diameter to carry away material which may be deposited in the water. Troughs should be subject to frequent and thorough cleansing and disinfection.

The trough equipped with a float which permits the entrance of water only as the amount in the trough is lowered by drinking should not be tolerated.

Today the general public is becoming awakened to the manifold dangers lurking in the public drinking cup for humans, and a number of states and cities have prohibited by law the maintenance of public cups by transportation companies and in office buildings.

To keep abreast with the modern progress of sanitation and preventive medicine, and to protect the horses who must drink wherever water may be presented, we should work for the abolition of the public drinking fountain, or for its regulation, permitting only the establishment of such fountains as are constructed upon sanitary principles.

DISCUSSION

The Chairman: Dr. Woodward's paper is now open for discussion.

Dr. Kinsley: I have been very interested in this paper, particularly the part referring to the drinking fountains. The drinking fountain has given us considerable trouble in Missouri, particularly in Kansas City. About ten years ago we had open drinking fountains, and found officially in that city during that year, I think it was 1903, about 400 cases of glanders. We have been successful in closing those drinking fountains, although it has required nearly ten years in doing it. Last year we had about 20 cases of glanders, and this year up to the present time 5 cases. Understand, I am speaking now of the official cases. Some cases of glanders are disposed of without the knowledge of the officials in our city, as well as in other cities.

But there is one other item in relation to the open drinking fountain that I believe is equally important in the spread of infectious diseases. We have been having a very severe time this summer, because of the extreme hot weather, and the practitioners over the city whom I have had the pleasure of meeting with just recently say they have had less colics since the water fountains closed than they ever had before. Now perhaps some of you will think it is not beneficial to the practitioners. It isn't in a sense, but it is very beneficial to the horseowners.

I know of teamowners having from 100 to 150 teams that ordinarily in previous years, while the open fountains were used by the horses, had cases of colic on an average of one to three every day. In this year they have gone as much as a month without a case of colic in their barn. These men seem to think it was because of the fact that their drivers are required to carry a drinking pail for the horses, and the horses are not given an oversupply of water when they are too warm. Although they are required to water their horses, not watering them being sufficient cause for discharge of the driver, there has been only a few cases where it has been found necessary to discharge the driver. A man having experience with horses can certainly tell when the horses come in at night whether they have been watered in the forenoon or in the afternoon. We find that the closing of the open drinking fountains has been very much in favor with the Kansas City horseowners.

Dr. Dalrymple: The individual drinking cup for the horse has been in vogue to my knowledge for thirty to thirty-five years in London especially; that is, the carrying of a bucket or pail to give to the individual horses, water from their own pail. I am sorry that Dr. Douglass, New Orleans, is not here, but I understood him the other day to say that they have installed the overflow water-trough in that city recently and it has decreased the number of cases of glanders very materially.

Dr. Ward: I would like to say that in Minnesota about ten years ago glanders was extremely prevalent. In the twin cities we killed annually about 150 horses from glanders. We decided that the disease was disseminated from the public drinking fountains and we closed them down in 1906. We noticed that the number of cases immediately began to drop and I don't think there has been one case of glanders killed in the city of St. Paul in the last four years and only two or three in the city of Minneapolis. We find that we have a great deal of trouble with humane societies. The only drinking fountain I am in favor of is, that the humane societies go to the fountain of knowledge.

Dr. Leech: I would like to ask Dr. Ward to give the body present information where those fountains can be secured. I am in sympathy with all this class of work, but the very reason for my asking the question is the fact that I come in contact with that class of men every day in the week and I don't know that there is a man in the room but what could give you the same experiences. I would not only include the humane officers but I would also include the health officers of the average municipalities of this country. They do not believe that the work done by this Association is of any great importance to the municipality. It is almost impossible through political influence to obtain any legislation without an outbreak, and I sometimes pray for an outbreak. I wish to emphasize the fact that we are trying to work on the underlying principle that we all understand must be supported and must also be maintained by the idea advanced by Dr. Ward—the education of the health officers of municipalities whose authority is upheld by politics.

Dr. Woodward: I would say that the humane societies seem interested at the present time in the water trough for animals. The *Humane Review* devoted half of a recent issue to a discussion of the water trough, and included in that the publication of a synopsis of my paper which I mentioned as having been read at the Indianapolis meeting in 1912 of the American Humane Association.

The Chairman: If there is no further question we will close this discussion. I am sorry to state that the next paper we will have to postpone until tomorrow afternoon at four. This is to be illustrated with 3000 feet of film, and inasmuch as this is Labor Day, Dr. White could not secure any electrician.

In the meantime we will call on Dr. Archibald, "Apparent Inconsistencies of Biologic Diagnostics."

APPARENT INCONSISTENCIES OF BIOLOGIC DIAGNOSTICS

By R. A. Archibald
Oakland, Cal.

Many of you in resorting to the use of biologic diagnostics for the purpose of clearing up obscurities in connection with certain diseases have, no doubt, occasionally found that the result of such tests have failed to bear out or corroborate your clinical and post-mortem findings. As a consequence, you have undoubtedly been disappointed, and have, perhaps, lost faith in such tests or in the technic observed in their performance. In other words, the tendency is to assume under such conditions that biologic diagnostic tests are frequently inconsistent and unreliable. For instance, you may take a tuberculous or glanderous individual, one showing suggestive clinical symptoms, and submit him to a a biologic test, and you perhaps obtain a negative reaction. Not being satisfied with the result of the test, you subsequently apply a second test, and with this test you may obtain a positive reaction. Again you may test an individual for glanders or tuberculosis with two different biological methods, and you obtain a positive reaction with one test, while the other may prove negative. Under these conditions it would seem natural or justifiable for you to conclude that the biologic tests applied were inconsistent and unreliable or that the technic observed in their performance was faulty. The human clinician or therapeutist can hardly be blamed for losing confidence in the so-called Wassermann test when from 5 to 15 per cent. of syphilitic individuals fail to show a reaction at perhaps a stage of the disease when a positive diagnosis is most desirable, unless he understands the reason for such failures. The same is true with other biologics, such as the mallein and tuberculin tests, as we occasionally are presented with clinical cases of glanders and tuberculosis which fail to react to these agents.

It is our purpose to endeavor to demonstrate to your satisfaction that biologic diagnostics if properly applied are absolutely consistent, but that this consistency depends upon the condition or upon the stage of the disease through which the patient is passing at the time they are applied.

In discussing matters pertaining to biologic diagnostics we do not intend to go deeply into the various and devious ultra-scientific problems incidental thereto; we will simply aim to present the subject in as practical a manner as possible. This procedure is deemed best in view of the great diversity of opinions which exist with reference to the question of biologic reactions. Furthermore, it is not our purpose to prolong discussion along these lines beyond the bounds necessary to a proper and practical presentation of our subject.

In order to facilitate the discussion of this question, we propose to arbitrarily divide the various biologic tests into two classes: First, immune or anergic tests, and second, anaphylactic or allergic tests.

Under the head of immune tests come such reactions as the complement-fixation, agglutination, precipitation, etc. These tests depend upon the determination as to the presence or absence of immune elements in the blood of the individual to be tested.

To illustrate this more fully, we will briefly describe the principles involved in some of these tests. In the study of the complement-fixation test, it is necessary to consider three elements whose presence is absolutely essential for bringing about a positive reaction, namely, antigen, amboceptor and complement. The term antigen is applied to any proteid substance that will, when injected into an animal body, give rise to the formation of hypothetic immune substances designated as amboceptors. It would appear that any proteid substance which may be introduced into the animal economy other than by the natural channel (the digestive tract) will give rise to the formation of these immune substances, amboceptors.

The function of the amboceptors, as their name indicates, is to act as a go-between the antigen and the activating substance, the complement, which is a constituent of normal blood. Antigen and amboceptors are more or less specific one for the other; the complement, however, is regarded as being non-specific. The combination of these three elements appears to be a proteolytic one, or in other words, is for the purpose of breaking up the antigenic proteid substance and changing it from complex into simpler forms, for the purpose of permitting the nutritive portions to be assimilated and for the elimination of those portions which cannot be used for the purposeful end of the body cell. In fact, it is a process of parenteral digestion going on within the animal body, aside from natural or enteral digestion which takes place normally in the alimentary tract. It must be remembered that in the case of disease-producing antigens the proteolytic action results in the liberation of toxic substances which attack the body cells, causing various pathological changes, the character of which depends upon the selective nature of the specific antigen.

To illustrate: If we should inject a susceptible individual with, say, glanders bacilli, which would in this case represent the antigen, the formation of immune bodies or amboceptors specific for the glanders bacillus would be the result, so that later, if we obtain serum from said individual and add to it glanders bacilli or an extract of same, and complement obtained from the serum of a normal individual, the three substances, antigen, amboceptor, and complement, will become anchored or fixed, demonstrating the presence of the amboceptors, the specific substances sought for. It can be readily understood, however, that if the serum is obtained from the inoculated individual at a time when specific amboceptors are not present in the blood serum, that is, when the individual is in an allergic stage, your test would prove negative. In such diseases as syphilis, glanders, tuberculosis, etc., we have reason to believe that there are periods in their course in which amboceptors or immune substances may or may not be present; consequently, if the test be applied during a period when immune substances are not present, the complement-fixation test will naturally give negative results.

The condition known as immunity undoubtedly may be transient or permanent. When only transient the power or habit on the part of the tissues or cells to produce immune substances is lost, due to the lack of sufficient stimulation by the products of the infecting agent, and as a consequence the infected individual becomes anaphylactic. This is particularly true of such diseases as tuberculosis, glanders, syphilis, and other chronic infections. In these diseases, when the infecting organisms become walled off from the normal tissue, or become encapsulated, there is no destruction of bacterial cells, no liberation of endotoxic elements, no stimulation, and as a consequence immune bodies cease to be formed and disappear from the blood stream through the natural channels of elimination.

Agglutination and precipitation reactions depend upon the presence of immune substances, which receive the name of agglutinins and precipitins respectively. These substances, while perhaps differing in some respects from amboceptors, still are so intimately related that it is almost impossible to separate them, and it is generally believed that they exist in an animal undergoing immunity at the same time. Therefore any statement made with reference to amboceptors will also apply in a general way to these substances; consequently nothing more will be said regarding these tests at the present time.

Under the head of anaphylactic or allergic reactions come such tests as the mallein test for glanders, the tuberculin test for tuberculosis, the luetin test for syphilis, the Irons test for gonococcus infection, etc. These tests are dependent upon the fact that the infected individual has become allergic or hypersensitive to the toxin of the specific infection to such an extent that, when the specific toxin is brought in contact with the tissues or cells of the infected individual, injury to such tissues or cells is the result. This injury interferes with the functional activity of such tissues or cells, or perhaps destroys them entirely, giving rise to the clinical manifestations that indicate a positive reaction. It matters not whether the toxin is applied locally, as in the case of the ophthalmic or cuti tests, or as in the case of the subcutaneous test, the results are essentially the same, providing the individual is in an allergic condition.

Care must be used in interpreting skin reactions, however, as the skin has not only a marked affinity for foreign protein substances, but also reacts in a striking manner to various split products, and the intensity of such reactions may lead us to reach wrong conclusions as to the extent and progress of the existing pathological changes.

From our knowledge of the mallein or tuberculin tests, we know that there are occasions when an infected individual will fail to give a positive reaction, yet this fact cannot detract from the efficacy of these tests. The failure to react is simply an indication that the condition of the individual at the time the negative anaphylactic reaction is obtained is one of immunity and not one of anaphylaxis. It can also be readily understood that an infected individual may be in an allergic and in an immune condition at the one and the same time. In fact, this condition is rather the rule than the exception; but it is occasionally true that only one of these conditions may exist, more especially in such chronic conditions as tuberculosis, glanders, syphilis, etc., during certain stages of their course.

It is believed that the tissues or cells of susceptible individuals do not normally possess specific affinity for toxic substances, but acquire them by association with specific infections and their toxic elements. This specific receptivity is the result of the stimulating action by specific toxins, and constitutes the stage of anaphylaxis or allergy, a condition that is present when the clinical symptoms of a disease are first manifested.

It would seem as if the symptoms of a disease arise when amboceptor becomes concentrated sufficiently to break up the infecting organism, or in other words, when specific proteolysis begins.

The general conception of the present time is that on sensitization, immunization with protein substances, elements of the general nature of amboceptors are formed. These are specific, and their union with antigen in coöperation with complement results in the liberation of toxic substances that produce the anaphylactic symptoms and lesions and this action is regarded as one of parenteral proteid digestion.

From what has already been said it is easy to realize that while an infected individual is not in a stage of immunity such tests as the complement-fixation, agglutination or precipitation will fail to give positive results, and the same is also true, that when an individual is not in an allergic or anaphylactic stage he will not react to such tests as the mallein or tuberculin. It is a well-known fact that if we attempt to test a second time a glandered or tuberculous individual with mallein or tuberculin, before a sufficient time has elapsed following the first injection, we fail to obtain any reaction, for the reason that the first injection of toxin has produced as the result of stimulation of the body cells a condition of temporary immunity, or as sometimes referred to, a condition of anergy or anti-anaphylaxis.

Whether this refractoriness to tuberculin and mallein that develops in certain cases of tuberculosis and glanders is truly anergic is not definitely known, but it is quite evident that refractoriness may be induced by a large dose of antigen in the latter stages of incubation; nevertheless, it is a fact that the tuberculin or mallein reactions, while best developed in true tuberculosis or glanders, are also obtainable by sensitization with mallein or tuberculoproteins. Does it not seem reasonable, therefore, that similar conditions may naturally prevail during the course of such chronic conditions as glanders, tuberculosis or syphilis?

The study of such a disease as typhoid, which ordinarily follows a definite course, teaches us that at certain stages of the disease the application of an anaphylactic test will give positive results, while during the same stage an immune test will give negative results. It has also been taught us that a certain time must elapse subsequent to the appearance of clinical evidence of this disease before an immune test will prove efficacious. The inference from all this is to the effect that notwithstanding the fact that you may have, for instance, a Wassermann performed on a syphilized patient today with negative findings, and another test applied a month or so from now with positive results, it does not mean that the laboratory technic is in error or that the test is at fault; it simply implies that at the time of the first test this patient was in an allergic condition, and subsequently became an anti-anaphylactic by acquiring immune substances in his blood.

An interesting feature of anaphylaxis and immune phenomena lies in the fact that hypersensitiveness to a foreign protein develops only when a certain period of cessation of the introduction of the substances is allowed to elapse before the next injection, which then produces the well-known symptoms. Thus continuation of inoculations at regular short intervals does not necessarily confer on the recipient of the foreign substances anaphylaxis during that period. It is, therefore, more likely to develop an anaphylactic condition in those patients who are infected with certain organisms which remain in the body for a long period of time, during which time their activity undergoes fluctuation, owing to the production of certain antagonistic substances by the infected host.

The clinical course of syphilis, glanders or tuberculosis fulfils all the requirements that lead to the development of either immune or allergic conditions.

Due to lack of time, we have refrained from going into the technic of the various tests; but we wish to state that if there is any one present who desires to go into that phase of the problem, we shall be pleased to answer to the best of our ability any questions that may be propounded.

This brings us to the last and perhaps from your point of view the most important point of all, viz., "How the apparent inconsistencies of biologic diagnostics may be overcome."

In such a disease as glanders, the problem is, comparatively speaking, easy of solution. To eliminate error in the case of such a condition as glanders, it simply becomes necessary to apply simultaneously both an anaphylactic and an immune test. In this way you are almost certain of obtaining positive results no matter in what stage of the disease your individual may be. In view of the recent achievement of Hideyo Noguchi in successfully cultivating the *Spirochæta pallida* we are hoping to be able to make a positive diagnosis in any stage of syphilis. By cultivating the *Spirochæta pallida,* Noguchi has accomplished that which will probably enable the laboratorian to use a specific antigen in the performance of the complement-fixation test, and will also enable the clinician to apply at the same time an anaphylactic test in the form of an extract of said organsims.

As regards biologic diagnostic tests for tuberculosis, we shall still have to pin our faith upon allergic tests, for the reason that up to the present time no practical method has been evolved for determining the presence or absence of immune elements in that disease. Many laboratorians, however, are working along these lines, and it is to be sincerely hoped that the day is not far distant when a practical immune test for tuberculosis and many other obscure diseases will be found. When that day comes many of the errors and uncertainties regarding this and other diseases that run a variable and more or less indefinite course will have been dispelled.

DISCUSSION

THE CHAIRMAN: Dr. Archibald's paper is now open for discussion. It merits a very spirited discussion indeed.

DR. GIBSON: I would like to volunteer first to say that I appreciate the paper very much and I ask Dr. Archibald if he doesn't think it would be proper, in all cases where a mallein test is to be made, first to draw the blood to obtain the sera for the complement-fixation on the same animal before they have ever received any mallein, as we now recommend in our state control work.

DR. ARCHIBALD: In applying two tests, the complement-fixation and the mallein test, it would be absolutely necessary to take the blood for the complement-fixation test before applying the mallein, because the injection of mallein into a normal animal will after a lapse of a certain length of time give rise to an immune substance in the blood that would cause a positive complement-fixation test, so the blood should be taken at the time the mallein is given or before.

DR. KINSLEY: Shouldn't you prepare for both tests?

Dr. Archibald: The tests should be carried on simultaneously.

Dr. Gibson: The reason I ask the question is this: It has been customary I know with us to make mallein tests and then if we could not settle the outbreak and get rid of the suspicious cases we would wait until we thought sufficient time had elapsed. First we thought only ten days would be sufficient, now we are told thirty days might not be sufficient. It is settled in my own mind that hereafter when I find it necessary to use the mallein test, in connection with an outbreak of glanders, I am going first to draw the blood for the complement-fixation test before I use mallein. At present we have laboratories that are contradicting each other on the complement-fixation test. The one that gets the negative results says that now the positive result was due to the fact that we were too close to the mallein injection. I have about come to the conclusion that the only safe way to work those tests is to draw the blood first for your complement-fixation and then any mistakes cannot be charged up to previous malleinization of the horse.

Dr. Eichhorn: I fully agree with the Doctor that there have been errors made in stating the effect of mallein on horses to be tested by complement-fixation. When we published the bulletin on this test we accepted the experience and experiments of some other workers, and stated that after a short interval following mallein injection the blood may be drawn for the serum test. Since that time, however, we have undertaken quite extensive experiments, not on several horses but on a number of horses, and injected these horses with mallein to determine how long their blood will influence the different sera tests, especially the agglutination and the complement-fixation tests. In the paper which I read here there will be a table attached which shows the action of the mallein on the serum tests for a period of two months, and then a subsequent mallein injection of the same horse. We find that after the first or second injection, the blood of the malleinized animal will give a complement-fixation for a time, varying from four weeks to two months, and the agglutination test will be influenced from four to five weeks. There is no question any longer but that the mallein will affect the serum tests and it is always advisable to draw the blood at the time of the malleinization. It may be drawn three to four days after the malleinization, since the complement-fixation test is not affected by the malleinization for from seven to nine days. The agglutination value commences to rise after the third day. For this reason I would always advise to have the blood drawn at the time the mallein test is made and errors would then practically be excluded.

Dr. De Vine: Would Dr. Eichhorn make it equally plain that the vaccine affects the blood test similarly or more so?

Dr. Eichhorn: A little more so. The table which we prepared in connection with these experiments shows that the effect of mallein is not quite as lasting as the vaccine. In some of the horses the effect of the vaccination lasted for ten weeks and even longer.

Dr. Fitch: I would ask if there has been anything said as regards the effect of the vaccine upon the subcutaneous mallein test or upon the ophthalmic test; what effect the injection of vaccine has on these tests if any.

Dr. Eichhorn: We have not applied the subcutaneous test in connection with our vaccine experiment. We only used the ophthalmic test, and found that this test is not affected by the vaccination at all. As a matter of fact, in the horses which we vaccinated, and which were then exposed to the disease, the serum test as well as the ophthalmic test was positive right through in those horses which contracted the disease. On the other hand, in a vaccinated horse, when the immune bodies disappeared and the agglutination as well as the complement-fixation test returned to normal, we found that the eye test was negative; that is, the eye test remained negative during the period when the agglutination and the complement-fixation were positive, as the result of the vaccination.

Dr. Atwood: In acute cases of glanders how soon after infection does the body throw out antibodies? I have had two cases of glanders that were negative to complement-fixation test and positive to agglutination test. In tracing them up and talking to Prof. Conn, our state bacteriologist, he said that there would be some acute cases where agglutinins are formed before immune bodies. In those cases how many days would be required before the results from the complement-fixation test would be positive?

Dr. Archibald: I couldn't answer that. It has been worked out in some other diseases. Take, for instance, the case of typhoid. In typhoid it has been shown that you cannot demonstrate the presence of agglutinins until the sixth or seventh day. Probably Dr. Eichhorn can answer that question, but I have no data to answer it.

Dr. Eichhorn: We tried experiments on that too. Horses sometimes four or five days after the infection will give agglutination up to 1:5000, whereas the complement-fixation reaction will not appear until from seven to nine days after infection.

Dr. Reichel: Last year we took a normal horse and after testing him for precipitins and agglutinins we proved that the horse did not have glanders. After applying the mallein test, we observed the presence of precipitins at the end of the first day, and at the fifth day the serum agglutinated in the ratio of one to one hundred, and on the sixth day it was 0.005. The complement-fixation reaction was not strong enough or positive enough to warrant a definite diagnosis on the fifth day, but it was on the seventh day. The serum fixed at 0.02 on the seventh day. That was after the subcutaneous injection of mallein.

The Chairman: That closes the discussion. We will next hear from Dr. Kinsley, on the subject of "Sanitary Police Measures and Hog Cholera."

SANITARY POLICE MEASURES AND HOG CHOLERA

By A. T. Kinsley
Kansas City, Mo.

Statements in this paper refer primarily to the principal hog-producing states, that is, to local conditions in particular; but they will also probably be applicable to the entire United States, and in a general way to Canada and all other foreign countries.

It is not the purpose in this paper to enter into the pathology of this disease, but to briefly discuss some of our laws controlling the movement and quarantining of cholera hogs.

Hog cholera probably first made it appearance in the United States in 1833, in the state of Ohio, and since that time it has become widespread throughout the entire hog-raising section of this country. From reports it is evident that every state in the Union has suffered losses from hog cholera.

The extent of the losses in 1912 from hog cholera in Iowa, Nebraska, Kansas and Missouri exceeded three million hogs, with an estimated value of over thirty million dollars. The total losses in the United States for 1912 approximated one hundred million dollars. So far as can be determined from available statistics the relative losses both in the number of hogs and their value has never exceeded or been equal to the losses of 1912, and these extensive losses have occurred regardless of the fact that large quantities of anti-hog-cholera serum had been used. When pressed for a reason for the stupendous loss of hogs during the past year, it must be admitted that there has been some serious defect in our methods of control of this disease.

Hog cholera is now prevailing extensively in the four states above mentioned, and is quite generally distributed in all the states of the Mississippi Valley. It is probable that the losses for 1913 will be far in excess of those for 1912, unless some radical changes are inaugurated and enforced in the methods of control of this disease.

Practically every state has some law or regulation providing for the control of hog cholera, and during the past year many states passed new and stringent laws, some of which should be efficient, and if properly enforced will materially diminish the losses at once and ultimately will eliminate hog cholera from those states.

Nebraska has no quarantine regulations or restrictions for the movement of cholera hogs. Iowa has a regulation requiring the immunization of exhibition hogs, and a clause quarantining for thirty days all hogs immunized by the simultaneous method, and the premises where hogs have been simultaneously immunized, for six months. Missouri provides for burying or burning of carcasses of hogs dead of cholera, and has recently made provision for a three weeks' quarantine and simultaneous immunization of feeders. Minnesota has a provision requiring burning or burying of hog cholera carcasses, a provision permitting quarantining of affected herds, and a provision requiring the disease to be reported to the sanitary commission. Indiana permits removal from infected pens, of hogs showing no symptoms, providing vehicle of transportation does not scatter litter and that when hogs are unloaded all litter from the carrying vehicle is burned, and further, provided that the hogs are slaughtered where there is federal inspection. Another clause prohibits the sale of hogs for four weeks after virus has been used. Feeders may be purchased providing they be given the serum treatment within forty-eight hours after their arrival. A very important clause of the Indiana law provides for the report of the prevalence of hog cholera by all licensed veterinarians, failure to do so being sufficient cause for revocation of their license.. Kentucky provides for burying or burning carcasses of hogs dead of cholera and the immunization of exhibition hogs. Tennessee has a peculiar provision regulating the disposal of the carcasses of hogs dead of cholera; it provides that the carcasses be burned or sent to a rendering tank. They have a general law requiring the notification of the health board of any and all communicable diseases of domestic animals. Georgia prohibits the sale for slaughtering, breeding or feeding of hogs affected with cholera or hogs from infected pens.

Practically all of the foregoing states have general laws relative to infective diseases, but in nearly every state hog cholera has not been considered in the same relation as infective diseases of other animals. Presumably, every state and country, in accordance with general sanitary laws, prohibits the shipping of cholera-infected hogs to market; but it has been self-evident that hundreds and thousands of cholera hogs are transported to our markets every year, and thus far without any noticeable remonstrance from the sanitary authorities. It is very evident that hog cholera will prevail as an epizoötic as long as the producer is permitted to load and ship cholera hogs to market, for such procedure provides means of distributing infection throughout the country.

A few states have quarantine regulations relating to premises and hogs infected with cholera, but it is doubtful if any state actually quarantines cholera hogs. This is a serious mistake and must be overcome if this disease is ever to be controlled.

Previous to the use of anti-hog-cholera serum it was possible to control this disease so that the losses rarely exceeded 90 per cent. and in many instances 80 to 90 per cent. of the hogs in infected herds could be saved. The disease can be prevented from extending to the neighboring premises through a rigid enforcement of quarantine regulations.

A difficult problem in the control of any infective disease is obtaining the knowledge of the existence of the disease before it becomes widespread. In order that a disease be reported, each commonwealth should be divided into districts or units; in most of the states a county could be designated as a unit. Each unit should have a county veterinarian whose duty should be the investigation of reported outbreaks. A further provision should require the producer to report any disease of his domestic animals to the county veterinarian, who in turn should investigate and report to the proper state official. Every state should further provide for the reporting of all infectious diseases observed by graduate veterinarians to the respective health official, either county or state. If these regulations, which would probably vary somewhat in different states, were concisely prepared, duly published, and rigidly enforced, the producers would show their appreciation by complying in every detail.

Recently the writer visited a section of the country along the Iowa-Missouri border. No hog cholera had been reported in this particular section for several years, although it had occurred in some herds within ten miles of this community in 1912. One man had about 200 hogs and lived on the Missouri side of the state line. His hogs began to die in March or April, and up to the 20th of July about 180 had succumbed to the disease. This man did not inform any one that his hogs were affected until they were practically all dead, and when confronted with the seriousness of the lack of proper control he contended that the disease was not hog cholera. The carcasses had been disposed of by covering them in gullies and ditches on his premises. Three neighbors, whose farms are so situated that they receive drainage from the infected pens, now have hog cholera in their herds and the losses will be extensive. If a rigid quarantine had been enforced early in the outbreak, and the carcasses properly disposed of, the disease would probably have been confined to the one premise.

The proper disposal of carcasses of hogs dead of cholera is of very great importance in the control of this disease, because of the prevalence of carnivorous animals in all rural communities. Dogs, cats, fowls and various wild animals and birds consume freely of the carcasses of animals, and are no doubt a very important factor in the spread of communicable diseases. The fact that the virus maintains vitality in the surface soil and in the carcass for a considerable time should be sufficient evidence to warrant the proper disposal of carcasses of cholera hogs. In many communities in Missouri, Iowa, Nebraska and Kansas, in 1912, one could see the carcasses of hogs strewn in ravines, byways and highways and railroad right of ways, and even in the alleys and streets of the smaller towns. Such miscellaneous sowing of virus, no doubt, is in part responsible for the prevalence of hog cholera at the present time.

Another modern method of spreading hog cholera has been by the improper use of the virus in the simultaneous immunization of hogs against cholera. Even when the virus is used judiciously in the simultaneous immunization an occasional hog dies of cholera: It is very evident that the virus would exist in the carcass of such a hog. It is also possible that the virus is eliminated before death from fatally diseased hogs, and if hog cholera is similar to many of the other infective diseases the virus is eliminated from the simultaneously immunized hogs even though they do not die of the disease. It is, therefore, an undisputed fact that many new centers of hog cholera have had their origin from the sowing of the disease by the use of virus in immunization. The quarantining of all hogs for a period of four weeks and quarantining the premises for six months where said hogs were immunized, as required by the regulations in Iowa, is the only safe procedure where the virus is permitted to be used.

In conclusion, it is evident that the various states in the principal hog-raising section of the United States have either insufficient laws for the efficient control of hog cholera or the sanitary authorities of said states are not enforcing the laws controlling hog cholera in a manner to obtain results that should be obtained. Further, it is the opinion of the writer that if laws and regulations were provided and enforced (1) prohibiting shipping of cholera hogs; (2) providing strict quarantine of infected premises and the proper disposal of the carcasses of hogs dead of cholera, and (3) effectually controlling the distribution and use of virus, the losses from hog cholera could be reduced fully 50 per cent. without the use of any anti-hog-cholera serum and 90 per cent. by combining police control measures and the judicious use of serum.

DISCUSSION

Dr. Higgins (In the chair): Gentlemen, you have heard the paper of Dr. Kinsley. It is now open for discussion. The subject seems to be very pertinent in certain states which he has mentioned. I believe there are some men from these states and we expect to hear from them.

Dr. Gibson: I think there is very much truth in the paper that Dr. Kinsley has read. He mentioned Iowa legislation. Since I met some of you gentlemen I have been relieved of the hog-cholera-serum business in Iowa, which I expected, and which I was warned that I would be. I am still trying to look after the legislation. We have three rulings by our Animal Health Commission, I might say four, pertaining especially to the cholera of hogs. The first was relative to the importation of disease. I think that is always the place to begin. We say we have enough of it at home and we will have none of it from you. So we made our importation rules, which require that all hogs imported into the state of Iowa, except for immediate slaughter, be immunized not more than thirty days prior to shipment when serum alone is used, and not less than thirty days prior to shipment when the simultaneous method is used. We have a rule pertaining to hogs exhibited at state and county fairs which is in substance the same as the importation rule, which is that they must be immunized in order to be exhibited, if with serum alone not more than thirty days before, and if with the simultaneous method at least thirty days prior to exhibition.

We have an addition which says that all hogs receiving simultaneous treatment in the state of Iowa must remain in strict quarantine for not less than thirty days. We are a little in doubt about that. We don't know if thirty days is long enough for them.

We also have a rule that states that all hogs dying of cholera should be burned and not buried. Dr. Kinsley has brought out a point in connection with the disposition of hog-cholera carcasses. It has been the practice since our state was inhabitated to put these dead hogs into the the drains and ditches, the little ditches that are formed by the water that gathers and by the rains and snows. It has been the practice to take these dead hogs and throw them into those little trenches and cover them over a little bit and if there is any way possible to infect the entire water supply of a district I don't know how you could go about it better than by the custom that has been in vogue in disposing of carcasses of cholera hogs for fifty years.

Now we are advising procedures in connection with these rules, especially the exhibition rules, which will aid in the matter of the production of an immune herd, if possible, for the breeder. To the exhibitor and breeder, who exhibits a herd all over the country, goes to all the fairs and sells boars and gilts to his customers all over the state and in various states, we are suggesting that they prepare in the most remote part of their farm, the most remote from where their hogs are fed and bred and raised and kept, a detention hospital pen, and then take to that place the entire herd, if they wish, or any part of the herd, even the show herd, for immunizing purposes and keep them there for thirty days at least and dip them thoroughly when removing them from that hospital and before bringing them back to the hog-producing part of the farm. We think this would save some trouble. Next to the evil that has existed in the disposition of the carcasses of cholera hogs is the condition that has always existed in connection with all our live-stock cars all over this country. There is no use ever talking about getting rid of hog cholera while cars go back and forth to Chicago and other slaughtering points with a foot of litter and manure in them and from which dead cholera hogs are taken at the end of the journey and then send those cars back all over Iowa and Illinois and all these states. Everywhere you pick out a shovel full of that stuff you have done enough probably to fix a township or two with cholera. Those conditions will have to be changed. Dr. Kinsley has very nicely touched upon almost all these points.

As you know we conduct in our state one of the experimental counties, or rather the government does, and we are trying to support them in it. We have required the stock-yards at every station to be cleaned and disinfected, and a number of them did not have floors and we had cement floors put in all the stock-yards at the stations. We have requested them to keep separate and apart one chute or pen as an import pen. Some yards are so constructed that they cannot successfully do this. The next move is to have portable chutes, and we are trying to unload the cattle now coming in for feeding purposes from the cars onto the main road that leads to the farm where they are to be fed, and keep them out of the yards that must be infected with cholera. Of course the disinfection of the entire stock-yard or pen, whether at a station or at a yard, is a very difficult proposition.

We are tacking up on every farm where cholera exists in the experimental county (Dallas County) a placard. The first word crossing the top of the card says, "Quarantine." Probably it would have served the purpose without the word quarantine. There isn't a word in the English language that the common people and even the educated people, and sometimes even a physician, shy at more than this word when they see it in print. They dodge it and they dodge what it stands for in many cases. The next is "Hog Cholera—Keep Out." And then, "Notice" (in smaller type at the bottom of the card): "Parties having business on these premises must keep away from hog-house." The other statement, "Occupants of these premises must not go in or near their neighbor's house."

This we think may be of some value. But to put the entire machinery of successful legislation into operation is something hard for a man to do who is trying to look after a whole state and hasn't an hour probably that he can sit alone by himself and figure upon anything or reason upon anything.

I agree entirely with Dr. Kinsley's reasoning in his paper that we must have legislation before we will ever get results in connection with hog-cholera.

Dr. Leech: I heartily agree with all Dr. Gibson and Dr. Kinsley have said and Dr. Gibson puts me in mind of something which I want to impress upon the minds of those present. Nothing has so forcibly impressed me throughout this class of work, sanitary police work, as the word sanitation. Dr. Gibson says the word quarantine has made more men shy at it than any other word in the English language. There has been no word by which the American people have been so gulled and no word that has been so misleading as the word sanitation. You can find anything that you want to look at nowadays advertised as being sanitary, and it is used in the sense that the public is led to believe that they are being protected, and yet they are not, because few of the men who are in every-day life looking after sanitary conditions realize the sense of the word. And I want to say that this has been one of the thoughts that I have had in my mind for some time on this hog cholera question, especially since serum work and the use of the simultaneous method or the virulent blood, involves the question of sanitary handling of those conditions. And I will go farther than the majority of people who are carrying on that work today and I would absolutely quarantine as Dr. Gibson says (and it would be strict, if I had to do it, and had the power to do it) all premises where hogs were being immunized with virus today. I would not allow virulent blood to be used on the farms, and allow men to travel back and forth and in and out and the hogs to roam promiscuously all over the farm, because I don't think it is sanitary, as I see it from a strictly sanitary standpoint.

Dr. McGilvray: I should like to advocate one thing in connection with Dr. Kinsley's paper. In following that remark of an outbreak in the Missouri Valley, I would state we had in Rawson, Manitoba, a small outbreak of hog cholera. We destroyed the hogs and traced it to a point in the west. We sent an inspector there, and in connection with that outbreak we also took the precaution that the men who dealt with the outbreak should look at no more hogs in the district. We then sent another officer to make another examination of all the hogs in the surrounding neighborhood and placed what you might term all of them under observation. We kept them under observation for three months and we had no further outbreak. I think in a case of that kind it always pays for a man to deal with the first outbreak and send a fresh inspector to deal with the others, except you satisfy yourself that the first man will disinfect himself. If you let the first chap go around to the neighbors you will have hog cholera, for he will carry it with him.

Dr. Reynolds: It seems to me that we are getting something pretty well settled in connection with this hog cholera problem. Something has been worked out as a matter of actual long-time experience that we ought to consider now as fundamentally settled. A number of those things have already been referred to. First, it is perfectly plain, of course, that we must have an adequate system of reporting, and an early report. It is highly important that provision be made for preventing the movement of sick or dead hogs along public highways or over the premises at the home. The control since the coming of the Dorset-Niles treatment has brought in a new condition that has not been emphasized.

It is a serious mistake for a state to permit the introduction of virus for simultaneous treatment, and I am of the opinion that it is a serious mistake for a state to permit anyone except a veterinarian in state employ to administer the serum-virus treatment, at least that is the ground we have taken in Minnesota. We have a law given us by the last legislature which prohibits the use or distribution or sale of virus except by permission of the state live-stock board, and we are very careful not to give it to anyone except the field employees of the board.

Now it seems to me that that question must be taken care of, and taken care of soon, because virus is being distributed frequently. It has been or it was last year in the Mississippi Valley quite frequently. Last winter I attended a state association meeting in one of the corn and hog-growing states of the Mississippi Valley, and it was freely stated there that farmers were getting virus with their serum and even getting it from commercial plants when they had not ordered virus. A veterinarian stated that the farmers came to him and asked him what they should do with a bottle of cholera virus that was sent to them. It is quite evident from the explanation which Dr. Kinsley has given us, that 1913 is going to be worse than 1912, and 1912 was much worse than anything we ever had. It is very serious. The breeding stock is sent to market, and the young animals are dying of cholera. It is a question what we will do for pork next year. I guess you will pay a handsome price for any pork that you buy next year.

This distribution of hog-cholera virus certainly must have attention, and immediate attention. So far as the disposition of carcasses is concerned it is so outragous to permit the dumping of carcasses into ravines and on hillsides that a convention like this ought not to take any time on it. Only a few years ago, in Minnesota, it was the commonest thing for a man losing hogs in the wintertime to haul them down and dump them in a convenient swamp, and they floated down the stream next spring, or he left them in gullies on hillsides. We have a law now that provides that hogs that have died of any disease shall be burned, or buried under four feet of dirt.

There should be provision to prevent the movement of hogs sick or dead of any disease over public highways or over any ground other than that of the owner, and of course the less distance they move the better.

DR. JENSEN: Dr. Reynolds, I was very much interested in a portion of your statement, especially in reference to the fact that in your state no one is permitted to use the virus except men connected with the state experiment station or the live-stock board. Have you sufficient men at your command to take care of that work? If you have I think perhaps you are the only man in the work that has, because in hog cholera to the extent that it has existed in our part of the country it has taken every available man, every veterinarian, to check it. I grant you that if it was always in the hands of competent men it would be better. We haven't got men enough. We have no live-stock sanitary board, and even if we had I doubt if they could handle it.

We have a condition in the state where the state official has employed agricultural students and sent them all over the state of Missouri to do that work, and he has even made the statement that those students were more competent than the veterinarians, and that of course was resented. There is a problem that we must not talk too loudly about. There is another feature, and that is when state institutions furnish virus and serum directly to farmers, it is a bad precedent. There are enough commercial institutions that will do it, but when state institutions engage in it, it is time for worry. I believe I understand the reason. There was a license granted for the manufacture of serum to a party in the west who was not a veterinarian at all and had no veterinarians in his employ. I would like to submit to this body what do you think of that situation? There are a great many problems in hog cholera and I would like to have them pretty well discussed.

DR. REYNOLDS: I would like to answer your direct question. If I were in absolute authority in your state I should enact legislation immediately which should forbid the use of virus by anybody except veterinarians in the state employ, regardless of the fact whether I had men enough to meet the demand or not. Still I should have that legislation and would enforce it.

That does not embarrass us in Minnesota at present, for the reason that we have so many cases of infected herds that we are unable to supply serum for all infected herds and we are producing it as rapidly as possible and using it exclusively for infected herds, and as nearly as possible in recently infected herds, especially on infected herds used for breeding stock.

When a man comes in for serum we get a statement from him how many hogs he has weighing from fifty to seventy-five pounds, and how many brood sows, and we tell him probably we cannot give him all the serum he needs but we will try to furnish him enough serum for his brood sows. We cannot supply the urgent need in recently infected herds, but by the figures the average shows that about 85 per cent. of hogs of the injected herds do not die from cholera. I should still enact that legislation even if I only had one man available.

DR. JENSEN: Yes, but wouldn't you be losing a lot of other animals that otherwise could be saved?

Dr. Reynolds: I think the losses would be greater on the other side, as a result of the uncontrolled and uncontrollable use of virus in other hands.

Dr. Jensen: Don't you think a veterinarian, if a competent man, even if not in the state employ, could use it satisfactorily?

Dr. Reynolds: Undoubtedly, I know many men in our state whom I know to be reliable and better than our field men, but it is extremely difficult to discriminate between John Smith and John Brown. John Smith may be a careful and competent man, while John Brown in the next town is not.

Dr. Dalrymple: I was a good many years in Louisiana before I saw a case of hog cholera down there, but for some time now, since our people began to improve the razorback and give him a little more width, by importing pure-bred hogs, we have had cholera and are getting more now. Our live-stock board prepares the serum for the farmers of our state, and as the experience of others has been we find the only thing they wanted was to protect the hogs. They never thought of giving the other fellow some disease by putting the carcasses along some stream or other. We got out a circular, mentioning the fact that unless the live-stock sanitary board was charged with the proper disposition and care of the carcasses of those animals, and unless they were properly cared for, we would not be able to give them the serum. They make application for the serum and we send it out on request. Chiefly the sanitary officers do the work. We have got excellent results, so far as I know, by the simultaneous method where it has been done by the officials of the board.

I know we have quite a carrier of hog cholera that we have been trying to eliminate. I suppose you have heard of the turkey buzzard? We think he is one of the worst carriers of infectious diseases that we have. For a long time our people thought there was a law protecting the buzzard. In the past, Texas had one and they repealed it in the last two years. We put it up to our attorney-general and found there had never been a law to protect the buzzard. We have a law about the protection of birds, and there is a clause about the protection of game birds, and there is another clause that says that anything that is a menace could be destroyed, and we put up to the commission the question of the buzzard being able to carry virus, for instance, anthrax. They immediately passed a resolution declaring the turkey buzzard a menace to the state. With the extermination of the turkey buzzard we will have much less spread of these infections which are very severe in some parts of the country. The turkey buzzard is being eliminated gradually from our section of the country. There is no doubt in the world that he is one of the greatest carriers of hog cholera. There is no doubt that the improper disposal of the carcasses is the greatest way to spread this disease. We have a law which gives the sanitary board power to make any sort of regulation and promulgate it to suit any sort of condition. I don't know how it is in other parts of the country, but with us it is a little hard to enforce laws. Perhaps our people have not sufficient regard for the law and are not amenable to it. They rather resist it and fight against it.

We are about in the same fix as you, but we try little methods to get them interested in it. It is a question of education and we are trying all sorts of ways to educate along sanitary lines. Until we get our folks to realize the importance of sanitation along those lines we will never do much with that disease or others.

We have a law requiring proper disposal by burning or burying all animals that die in the state. The police jury imposed a fine of fifty dollars and sixty days in prison for a man that didn't burn up every carcass that died of anthrax. They didn't have any wood in that section of the country and they do not have any coal to use. The man came and gave himself up, and said, "You can send us to jail for our natural lives, for we haven't wood enough in our district."

Dr. Bolser: In Indiana we have two laws that will help us a great deal in the control of hog cholera. We have a law that was passed compelling all fertilizing companies to take out a license from the state veterinarian, and he has to be a man of reputation and furnish an affidavit from two freeholders that he is a man that can be depended upon, and that law also provides that he cannot go on to a farm where there are any cholera hogs and then go on to another man's farm and take up a dead hog or sow. If he gets a cholera hog or a load of them he has to go to his plant and unload and disinfect his clothes, his shoes, wagon and wagon-wheels and mules or horses. We have a law compelling them to bury dead hogs and cover them with quicklime. We have also a bill that all serum used must be tested by the agricultural station. We have got a lot of commercial serum that fell down on us. The demand was so great that we got serum that wasn't good. Now this law provides that all serum shall be tested out by the experimental station. We furnish it only to veterinarians, unless to students of the agricultural school who are well known, but the law provides that it shall be furnished only to veterinarians.

Our great trouble in Indiana is to get serum in sufficient quantities to take care of the outbreak there. Once in a while a veterinarian will make a mistake in not using enough serum, and either the veterinarian or the assistant is sent to locate the trouble and rectify it and educate the people as to what they will have to do. We are trying to educate the people to the necessities of the sanitary measures. There are a lot of things the hog growers have to do that the veterinarian can't do, and it is a hard matter to educate them so that they will follow out instructions in the way of sanitary precaution.

We have had a great deal of infection this year from parties turning hogs on to long river grass or meadow, and opening up places where the fly will stick his bill in, and we had septicemia. It is a hard thing to educate them, but we are making progress.

Dr. Peters: I was very much interested in the discussion and I surely am heartily in sympathy with Dr. Kinsley's paper. The doctor has brought out some very good points and I feel that if we are going to eradicate hog cholera the sanitation work and the work connected with sanitation will be an important one in the future.

I am very much surprised to hear so many adverse criticisms along the line of the simultaneous methods and the serum methods in general.

I didn't expect to hear any criticism whatever, and I really didn't know what to say, why you have these large losses. We in Illinois are doing a great business. We have treated on an average for the last three months of 35,000 a month, and this month will run about 42,000 head. 95 per cent. of these are treated by the simultaneous method. Naturally you will find that I am very much surprised to hear this criticism. The only reason I think that the state of Illinois is not having this criticism is due to the fact that our veterinarians are very well versed with the correct use of the simultaneous method. They have been drilled thoroughly in its application and I have no hesitancy in allowing any of the men that have been registered with us to use the simultaneous method.

Dr. White: I would like to ask Dr. Peters what is necessary in order for a veterinarian to become registered with you?

Dr. Peters: We have some criticisms to make at first, and the veterinarian feels somewhat chagrined at times if we ask him to come to our laboratory and spend a day or more with us; but when the gentleman arrives and finds that we are willing to give him all our time for one day, instructing him in all the little trifles connected with this method that you gentlemen are thrashing out here today, I feel that over 95 per cent. of these men go back well repaid for coming and having this little conference. It isn't that we don't feel that they come from a good school, but we feel that these men have not had all the experience connected with this great work, and while they are veterinarians and can enjoy the best of practice, that does not indicate that they know all about this vaccination. There are a hundred and one little things that we have to tell them, and I feel, as I say to them, I might as well have trouble first as to have it afterward. I have these men come to me and we sit down and go over the situation from A to Z, and we show them the difficulties there are connected with the simultaneous method, the fallacy in using the serum-alone method, and all the little things there are that constitute a successful vaccination. I think it has been proved that our men have been successful. They are using it every day and I can't attribute our success to any other cause than to the fact that they know all about it. I don't wish to be understood for one minute to say that I am making any better serum than any other state, but I say that it is due to the fact that these men know what to do, how to handle a case, and that gets them out of these little difficulties, and that's why they have success.

Dr. Roberts: I also am from Indiana. I wish to say that Dr. Peters has already said that we prefer to send the representative right into the field to educate the veterinarian where he needs assistance. We instruct him how to administer serum in the proper manner. I might say we approve of the use of serum on infected herds. We have the opportunity of educating the hog-raiser and the farmer and educate them how the animal should be treated. That is very essential, also the diet and the place where the animal is confined after the treatment.

Dr. Steele: Dr. Kinsley's paper dealing with the control of hog cholera has brought up this very interesting point of whether or not we should use the double method. I would like to ask the Doctor from Illinois what guarantee he has that his work is producing good results.

I think that, as he goes along using the simultaneous method, unless he quarantines for more than thirty days, as they do in Iowa, the animal so treated is stirring up trouble that Iowa and the rest of hog-producing states around him won't get rid of for years and years. I think along with the control of hog cholera and the interstate movement of cattle and hogs you have got to take into consideration the infection that these men are causing with the simultaneous method, whether it is a trained veterinarian or a farmer that is injecting the virus.

Dr. Reynolds: There is one very important phase of this question that I think has not been given prominence. Before I mention it, I should like to call attention to the fact that there isn't anyone here who has any higher respect or confidence in the simultaneous treatment than I have. The difference is, I would be more restricted as to who should use it.

The point of the matter is public education. It seems strange how little of the most important things our farmers ought to know that they do know. In our plant it occurs frequently that intelligent farmers and managers and herdsmen of valuable herds come into the plant, knowing it is a serum plant and knowing there is virus there, and they walk around indiscriminately, and we find out who they are and we have to disinfect their shoes before we can turn them loose. A manager of one of the most valuable herds in the state came into the plant and walked around everywhere before we found out who he was, and someone called his attention to the fact that he was simply brewing trouble for himself at home, and then it dawned upon him that he might take cholera home on his shoes, so he was disinfected. They need a very great deal more education on the subject; they need extension bulletins from the agricultural colleges and the experiment station and articles in the farm papers and in the agricultural columns of daily papers. When our farmers know more of the details of hog cholera the problem will be much easier.

Dr. Peters: There is one thing I want to draw attention to. I think that our trouble throughout the entire state has been due to the fact that the experiment station and the agricultural veterinarians have given too much stuff to agricultural papers. The more you write on this subject to the agricultural papers the more the farmers feel that they can do this work themselves. It is going to be hard work for the sanitary officers to go to work and make them realize where the danger lies. My great difficulty has been to get rid of the stuff that is in the agricultural papers. They think it is so easy. The thing that we want is to get down to real facts and to work and have all these veterinary associations work together and let the veterinarians take an inventory and find out where they are shy, not condemning the methods in general, but find out where they are shy, go to it in a genuine way, and then we are going to get results. Unless we do that we won't get results.

The Chairman: Dr. Peters, would you answer the question of Dr. Steele on carriers of infection? How do you prevent them from spreading infection?

Dr. Peters: Well we don't have any infection to speak of. That's just all there is to it.

Dr. Steele: A hog that is treated by the simultaneous method, I believe it is true, will certainly throw off hog cholera.

Dr. Peters: They will in case your hogs become very sick. If they don't become very sick they won't.

Dr. Steele: That is enough.

Dr. Bolser: When we vaccinate in Indiana, using the simultaneous method, we quarantine our hogs for thirty days. Now we won't go on a man's farm and vaccine part of his herd unless he will keep them by themselves or in absolute quarantine. We don't allow them running along line fences or running along streams. We keep them in absolute quarantine for thirty days after we vaccinate them.

Dr. Gibson: In administering the simultaneous treatment how much serum do you give to the one hundred pound pig?

Dr. Bolser: We figured ½ c.c. to the pound, body weight. The only trouble we have had in Indiana with our veterinarians is in succeeding in getting them to give enough serum. We have had two places in Indiana in the last three months where the veterinarians have used the simultaneous treatment, but not enough serum to take care of it. One was a very valuable herd and the veterinarian only used about 20 c.c. on pigs weighing from 80 to 110 pounds. He used from ½ to 1 c.c. of blood and the result was disastrous. But that was the fault of the veterinarian; he had not asked for instructions. I was called upon to go and see what the trouble was. I wasn't very long in locating the trouble; they had not used enough serum to take care of the virus they had used.

The thing to do in the way of education is to educate your farmer that you must use plenty of serum. Some of them will feel that they are using too much because the cost will be too great; but you must educate him that you must use enough to take care of the virus. On the other hand, you must also educate your veterinarian that he must use enough serum.

Did you ask what I mean, Dr. Kinsley, in regard to that? The veterinarian must use all the serum he thinks he needs, and he must use plenty. If he doesn't he is going to have trouble.

Dr. Gibson: What death-rate do you have following your simultaneous method in healthy herds?

Dr. Bolser: We figure on 1 per cent.

Dr. Gibson: What do they die of?

Dr. Bolser: Septicemia. We have had a larger percentage in some herds. We have had extremely hot weather, and a great deal of humidity in the air. We have had quite a loss in some localities from septicemia, hogs dying within twenty-four to forty eight hours. That is largely due to the owners not knowing what to do with the animals. We try to get them to put them in a place that has been disinfected the day before, we don't let them turn them out for thirty-six hours, and we don't let them turn them on to long grass, or long river grass or long meadow for fifteen days. But the outbreak was so great over Indiana that they vaccinated without taking the necessary precautions. The farmer is to blame and the veterinarian is to blame, but we have endeavored in the last four or five weeks to educate them up to the necessary precautions.

Dr. Gibson: Do you believe a hog can be perfectly immunized without being sickened?

Dr. Bolser: He can be immunized for all time to come. If he weighs 60 or 75 pounds he will have some fever. It does not do any good to use the serum alone, but you have got to use the simultaneous method if you immunize them for all time.

Dr. Higgins: There is one point that has bothered me a great deal for many years in regard to hog cholera; that is the carrier proposition. I would like to know what danger there is in the throwing off of the virus during the immunization by the serum simultaneous method, and also how many chronic carriers do you get, if you get any.

Dr. Day: I would like very much to ask Dr. Bolser how he differentiates between septicemia and hog cholera. He states the he lost about 1 per cent. from septicemia.

Dr. Bolser: Doctor, those that die of septicemia die usually within twenty-four to forty-eight hours. A hog that dies of hog cholera becomes sick in six to eight days and will die in twelve to fourteen days. A herd that has not received enough serum will break in six to eight days and show evidence of cholera, and in twelve to fourteen days they will commence to die. Post-mortem examination will show those characteristic hemorrhagic lesions, but those cases of septicemia that I speak of die in twenty-four to forty-eight hours.

Dr. Day: Doctor, don't you think it is possible to have a hog die with hog cholera and not show any of what is generally considered as the characteristic lesions of hog cholera?

Dr. Bolser: Yes, sir; sometimes it is a pretty hard matter to find the characteristic lesions even in post-mortem. I think we have lost a great number of hogs from septicemia. You may take the same virus and the same blood furnished by our station and go to a herd that has been treated aseptically, using the same quantity, and not have this trouble; and you go to a herd that has been treated, but the veterinarian using the serum and virus has not taken the necessary sanitary precautions, and you will have trouble.

We scrub them first with a bichloride solution then we inject them; the place of injection is painted with iodine; then we take care of them. If we dont take those necessary precautions we will have many animals die within twenty-four to forty-eight hours.

Dr. Leech: I would like to ask Dr. Bolser how many hogs he considers he has lost from toxemia?

Dr. Bolser: I don't know. I can't tell you.

Dr. Leech: Do you recognize that you have lost any?

Dr. Bolser: I do not.

Dr. Leech: You would not attribute it to toxemia?

Dr. Bolser: No, sir.

Dr. Leech: To septicemia?

Dr. Bolser: Yes, sir. I am talking in regard to those cases that die in from twenty-four to forty-eight hours, not in those that sicken in eight or ten days.

THE CHAIRMAN: DR. Higgins asked a question in reference to the carriers. It has not been answered.

DR. GIBSON: I want to give him something to think about on that line. A very competent veterinarian, engaged in the production of serum in our state, last year favored us with a number of his test-checks on which he tested the serum. They were given very strong doses. The basis on which we immunized as instructed by him was 20 c.c. serum and 2 c.c. virus to the 100-pound pig. These hogs were immunized during testing of serum. Some of them were given the half dose of serum and a full dose of virus. Later on he transferred them to his own farm, and mated these big hogs that had been immunized in this way. At the time of farrowing, parts of those litters were farrowed dead, and on post-mortem those dead pigs coming from the uterus showed typical cholera lesions, as typical the doctor tells me as he ever saw in the field, yet the sows were immunized sometime before they were mated. I can't give you the length of time that intervened between immunization and the mating. He had other sows of that character and with that history, the pigs dying at ten days, each showing splendid typical post-mortem lesions of cholera.

Now this is in contradiction to what we have heard in the past. I think we are having some new things to follow. It appeared with the sows that were not sick a minute and showed no evidence of cholera. I believe he told me that he hyperimmunized those very sows and they stood the hyperimmunization. How did that cholera get into that litter in utero?

Speaking about immunization without serious sickness, I don't know that vaccine is any good that does not sicken, and that does not at least produce some of the symptoms of the disease you are vaccinating against. We have in Iowa a veterinarian who treated 25,000 hogs with the simultaneous treatment and used practically all his material from our laboratory. He said he was instructed not to give over ten drops of virus to any hog, and down to four or five drops to the average pig. He said at the most he only treated 180 well herds. The swine herds of Iowa average pretty close to 100 head per farm and he only lost $2\frac{1}{2}$ per cent. of the well herds. He admitted that $2\frac{1}{2}$ per cent. died with cholera and that's probably where his plunger slipped and he gave them enough virus to leave the man a cholera herd.

Now he was getting the reputation of immunizing these hogs for these farmers. Our state college, that now has the serum business, bought a shipment of immunized hogs from this veterinarian himself, that he immunized himself, and killed practically all of them, trying to hyperimmunize them. I cannot just give you the percentage, but I am not afraid to say here, not knowing the exact number in the shipment and the number that died, that half of them died in being hyperimmunized. He was spreading hog cholera on the farm and was not giving the farmers immunity in return.

I am certain that when I go out to immunize hogs and when I get through I have given them immunity, if the farmer will take the chance on his side. There is a lot of so-called immunization that is not immunization.

Dr. Atwood: I wish to get into the record the point of human beings consuming the hog-meat from hogs that have died from cholera; first, the danger from such rare, uncooked meat; and second, the danger from well-cooked meat.

Dr. Day: In answer to that question I will say this: We don't know at the present time that toxin of hog cholera is harmful in that way. There are cases, I understand, on record where people have eaten hogs that were affected with hog cholera and they have not been harmed at all. I don't know of any well-planned experiment along that line to determine just how much danger there is in eating that meat.

Dr. Moore: I would like to further answer this question of Dr. Atwood's: In some countries they use virus hogs for food. If Dr. Eichhorn were here he could give you specific information on that point, where hogs used for virus blood are sold in market for food, and I think in this country a great many hogs get into the local markets, that if they were examined post-mortem for disease they would be pronounced affected with cholera and rejected. I think if hog cholera was very dangerous to the human system a great many of us would have gone to our reward a long time before this.

Dr. Eagle: The question of using hogs from which virus has been obtained is interesting, because they do that to a great extent locally in Kansas City. At the present time the government does not allow the use of hogs from which they have taken virus; but there is an institution in Kansas City that is manufacturing serum that does sell all their pigs from which they have taken the virus, but that meat is consumed entirely within the state of Kansas, so the rest of you are free. I have seen lots of that meat sold in Kansas and in Kansas City; in fact, I know of a case where an entire family ate the pigtails of eight or ten hogs which had profound lesions of hog cholera and the only effect was a very bad case of diarrhea; otherwise they were all right. But that meat is being consumed in Kansas City today and is being sold within the state of Kansas for consumption, but is not being sold to any establishment having federal inspection.

The Chairman: In other words the federal law does not permit its use?

Dr. Behnke: There is nothing that I can add to what Dr. Eagle said regarding the judging of hogs affected with cholera and regarding the eating of hogs used for preparing serum.

Dr. Eagle: I would like to have a few more words to say. It seems the gentlemen in the assembly have not brought up the subject of the serum plants and the control of the same by the United States Government in distributing and manufacturing serum. The gentleman to my left states that all serum has to be tested before it can be used in his state. I would like to ask will they still use that same law after the federal government has taken over the inspection and running of serum plants?

Dr. Baker: I can't answer that. I don't know.

Dr. Eagle: At the present time the government asks these people or makes a regulation that they shall test the serum and specify the manner in which it shall be tested. Do you use 50 c.c. to a one hundred pound hog?

Dr. Baker: Yes, in the infected area.

Dr. Eagle: And don't use virus?

Dr. Baker: Yes. We increase our serum in infected herds and we increase it to about ½ c.c. per pound. Of course we realize or think it takes more on a larger hog.

Dr. Eagle: The reason I asked that was because the United States Government in their tests requires the serum plants to use 2 c.c. of virus to 15, 20 and 25 c.c. of serum, and we cannot ship the serum out unless it will stand up under such a test. All serum companies doing an interstate business are subject to that law.

Dr. Gibson: I will say, for the information of Dr. Eagle, that the Government in Dallas County is using ½ c.c. to the pound of weight; that is— 50 c.c. to the hundred weight, and they use it in well herds.

Dr. Baker: How much virus do they use?

Dr. Eagle: About 1 c.c.

Dr. Higgins: The supervision of hog-cholera serum has been mentioned. I may state, so far as Canada is concerned, it is a prohibited article of trade or commerce. We do not permit the serum or virus to come into Canada. We have practically no hog cholera.

The Chairman: If there are no further questions we will give Dr. Kinsley the closing remarks.

Dr. Kinsley: Perhaps I am not capable of judging, but it seems to me that the discussion has been entirely away from the subject at hand. You have discussed hog-cholera serum, which is an interesting subject, but not one properly before us.

Of course the use of the serum comes in, in a way. I have been much interested in hearing from the representatives of the different states about the laws they have in their state. Dr. Gibson spoke about requiring a quarantine for six months on premises where the simultaneous method had been performed, and Dr. Reynolds speaking of the fact that no one in the state except officials of the state could use the virus; and others along the lines, likewise.

Now the question to me is, Do you enforce those regulations, or is it simply a matter of statement? Is it a fact, Dr. Gibson, that those premises are absolutely quarantined for the length of time as stated by Dr. Bolser?

Dr. Gibson: Only in the experimental county. We are not attempting to handle the whole state.

Dr. Kinsley: And Dr. Bolser's statement about the fertilizer plant; that they must not pass along the border fence?

Dr. Bolser: We are enforcing that as far as we can.

Dr. Kinsley: That is the question I have been putting up here, the enforcement of police measures to control this disease. If this was foot-and-mouth disease, if the disease under consideration was pleuropneumonia, every one of you would take hold of it in a different way than you do in a case of hog cholera. We are not controlling hog cholera because you don't go at it in the way to control it. If you would use the energy that you use in foot-and-mouth disease we would not have the situation we have now. As I said before, hog-cholera serum is a useful adjunct. Someone said the Government controlled the distribution of the virus. I stated that if the virus distribution was regulated it would remove one of the very important factors in distributing hog cholera, and I believe yet it is one of the very important factors along the distribution of the disease. I don't want Dr. Peters to think that I am condemning the simultaneous method of treating hog cholera. It is all right if you are going to use it universally, and if you do not you are sowing the seeds of cholera, and the fellow who does not do it is going to suffer the consequences sooner or later.

Regarding Dr. Gibson's statement in relation to the manner in which the hogs are transported, he didn't say it but he intimated that the railroad company is at fault. The man who sells the hogs is the origin of the infected carrier. He is the man who ought to be prosecuted. The freight agent is not a veterinarian. He can't say that is a beautiful hog cholera case and I can't accept that. The state of Georgia, so far as I was able to find, is the only state that has any statute that prohibits the sale of such hogs for food, for breeding or for immediate slaughter. I don't see any one here from Georgia to know whether they actually enforce it or if it is just the law.

A MEMBER: I can tell you. They don't enforce it.

DR. REYNOLDS: We do enforce it. Our law is enforced.

DR. BURSON: I happen to be from the state in question, and while I haven't anything to do with the enforcement of those regulations, believe that they are about as well enforced as they are in other states. There are other things that I would like to just mention. A number of things have been mentioned in connection with the spread of hog cholera, but I believe I know at least two that have not been mentioned. One is old brother possum and another is the stray dog. Let us not forget the stray dog in connection with hog cholera. And while we all recognize the fact that the buzzard is a spreader and a carrier of infectious diseases, if we can so educate the farmers as to get them to properly dispose of the carcasses of these animals that die on the farm, we will have taken away from the buzzard his natural occupation and he will go elsewhere.

They tell us that right here in New York City there was a woman who was a cook. They refer to her in medical literature as "Typhoid Mary." I believe she was responsible for a number of serious typhoid outbreaks here. How are we to determine that we haven't any number of typhoid Marys in hog herds all over this country? I believe this, that the solution of handling hog cholera lies in educating the farmer, in enforcing proper sanitary laws and regulations, and reinforcing these things by the use of serum alone.

DR. BOLSER: I just want to inform Dr. Kinsley that our law provides that every veterinarian in Indiana must report any outbreak to the state board at once. If a shipment should get away, the federal inspectors report to us and we go after the shipper and also the man he bought them of. Our state is large and our force is small, but we are going after those fellows and we will educate them eventually so they won't do it.

DR. DYSON: It seems to me one of the most important things in the spread of cholera has been overlooked and that is interstate shipments and the purchase of live-stock at infected yards. Cattle and hogs are unloaded indiscriminately. A man comes to Chicago to the public stock-yards to buy a load of cattle. Dr. Gibson has taken the precaution in his state; he unloads them at a separate chute and all that; but they have been handled through the public chute coming to market, and probably loaded into a car back to Iowa that carried cholera hogs to market in the first place. It seems to me that it is an interstate proposition and that the government will have to take charge of all interstate shipments and the disinfection of all stock-yards before it will allow any animals to return from a public stock-yard to a man's farm in another state.

The Chairman: I can see by your countenances that you are getting hungry and we will not keep you but a moment longer.

CONTROLLING CHICKEN-POX, SORE-HEAD OR CONTAGIOUS EPITHELIOMA BY VACCINATION

By F. B. Hadley and B. A. Beach
Madison, Wis.

Introduction. During the winter of 1912–13 there appeared among the poultry at the Wisconsin Agricultural Experiment Station an outbreak of chicken-pox, sore-head or contagious epithelioma which progressed rapidly and bid fair to run through the fowls in all the pens. The disease greatly reduced the egg production, which is a matter of prime economic importance with every poultryman. Besides, infected birds lost vitality which they were very slow in recovering and not infrequently death resulted. Steps were immediately taken to control the epizoötic. The infected birds were given the ordinary treatment and quarantine measures were instituted. However, even with these precautions but little headway was made, for new cases developed daily.

These disappointing results showed that the usual methods of treatment and disinfection would be ineffectual in controlling the outbreak; therefore an attempt was made to confer an immunity upon all fowls which did not show pock symptoms by injecting an autogenous vaccine. This treatment promises well and seems to have solved the problem of prevention and control.

While this work was in progress several experiments were carried out and interesting results obtained which should be valuable to all poultrymen and veterinarians. This paper has been written to record our experimental results and to make available the technic of preparing the vaccine so that others may employ it if occasion arises.

The vaccine treatment is especially applicable in large commercial and experimental flocks, where the greatest losses are sustained and where preventive measures can be most economically carried out. Breeders of pure-bred and fancy fowls, whose stock would be impossible to replace, should also find it valuable.

History and Occurrence. Chicken-pox has been known in this country since poultry raising became extensive enough to be termed an industry. For how long before this we are not in a position to state; but presumably the disease has existed for many years in the southern states, where it is often rapidly fatal and assumes a very important place in the list of poultry diseases.

This disease has been particularly prevalent in Wisconsin during the past year. Early in October, 1912, several small poultry raisers in and about Madison sent hens, which were sick and others which had died from unidentified diseases, to the Agricultural College for detailed examination. A diagnosis of chicken-pox was made in several cases, from sections quite widely separated, before the outbreak occurred in the University flocks. Chicken-pox was recognized by Professor J. G. Halpin, of the Poultry Husbandry Department, among fowls on exhibition at several mid-winter poultry shows. He also states that the disease made its appearance in various flocks in Michigan during the winter of 1907.

Various investigators have studied this and related fowl diseases. Among the publications in American literature may be mentioned those by Ward,[1] Cary,[2] Kinsley,[3] and Haring and Kofoid.[4]

CAUSE. There is yet considerable doubt as to the exact cause of chicken-pox. Marx and Sticker[5] and others state that a filterable virus is the causative factor. In the beginning of the disease the blood has been said to contain the virus. Our experiments to support these inferences resulted negatively, but were limited in number and for comparative purposes must be judged accordingly.

Pox material was used by Lipschutz[6] to seed culture media with the hope that some specific organism could be isolated, but his results were not positive. Cary failed to reproduce typical sore-head lesions in chickens inoculated with various organisms isolated from infectious material. Dr. O. V. Brumley, of the Ohio State University, has succeeded in recovering an organism or organisms from roup-infected fowls which he states will produce an immunity against roup in susceptible birds when used as a vaccine.

Much careful work has been done within recent years in an attempt to demonstrate that chicken-pox and roup are due to the same virus. Prominent among the men who have investigated this phase of the subject are Uhlenhuth and Manteufel,[7] who have contributed much valuable data to the pathology of both diseases. Schmidt[8] and Sigwart[9] have also discovered and reported interesting details.

In view of our knowledge relative to glanders and farcy, it is certainly logical to presume that chicken-pox and roup are the same disease manifesting itself in different forms. However, differences of opinion exist among investigators on this question. Those who maintain that these are two distinct diseases think both may be present at the same time.

Pathogenicity and Transmission. Fowls show a varying susceptibility to chicken-pox, depending upon the individual and the virulence of the virus.

We have been repeatedly successful in transmitting the disease by subcutaneous inoculations with a few drops of a normal saline emulsion of the virus made by freely macerating comb and wattle tissue from birds showing well-marked lesions of sore-head. It is not possible, however, to reproduce the lesions by this method every time. Sometimes apparently susceptible hens inoculated as above fail to react, and control birds do not develop noticeable symptoms. This is not to be wondered at when the nature of fowls as a class is considered, together with the peculiarities shown by the infection.

The incubation period varied from three to twenty days in our experimental cases. Diphtheritic membranes frequently appeared on the nasal, oral, and conjunctival surfaces when the diluted virus was instilled onto them or inoculated subcutaneously.

Microscopic examination of involved epithelium from the comb showed an increase in the size of the epithelial cells, which appeared to contain inclusions, and inflammatory changes in the deeper layers.

In commenting upon the significance of the various organisms which different authors have isolated from pox and roup infested fowls, Hutyra and Marek[10] have the following to say:

> The many conflicting results secured by different investigators render it improbable to attribute any specific role to the organisms isolated; but, on the other hand, when one takes into consideration the positive inoculation results secured with isolated pure cultures, the possibility still remains that under such special circumstances, namely, when the conditions for their multiplication in the body of the fowl are all favorable, they can occasion local diphtheritic inflammatory changes, or can less frequently produce well-defined lesions of a similar character. If one now considers the fact that the disease of the mucous membrane can be induced by filtrates from the disease products and also by intravenous injection of such filtrates, one cannot reject the assumption that fowl diphtheria, as well as chicken-pox, is produced primarily by the same

filterable virus subsequently to which facultative pathogenic bacteria attack the mucous membrane and contribute more or less to the development of the clinical picture of the disease.

SYMPTOMS, PROGNOSIS AND IMMUNITY. It does not seem necessary to discuss at length the symptoms of chicken-pox. Reference may be had to text-books and the literature recited at the end of this article for details. Suffice it to say, that our observations agree with the statement made by Pearl,[11] that as long as the disease is confined to the skin of the head the general health of the bird is unaffected, and in most cases egg production is not interfered with. On the other hand, just as soon as noticeable lesions appear upon the mucous membranes, the hens stop laying.

The recovery of this important function depends upon the individual and the extent to which the mucosæ are involved. In some instances not more than ten days will elapse before eggs are laid again; in other cases months may pass before the bird returns to her normal state. Emaciation in this class of cases is rapid.

A quotation from Salmon[12] substantiates our observations and experimental results, and is therefore given: "In the most violent cases, especially with pigeons, the eruption extends to the mucous membranes of the mouth and nostril, the resulting inflammation taking on a diphtheritic form and early death follows."

In the northern states, where the trouble usually occurs in the late fall and winter months, the prospect for recovery is good unless complications develop. The mortality is not great and depends to a large extent upon the condition of the birds when attacked, and the care and treatment subsequently given. Where a progressive form of the disease involving the mucous membranes occurs fatalities are more numerous. Blindness results when the conjunctival tissue is extensively involved. This makes it impossible for the birds to see food, and death soon follows. Cary found that affected birds may recover in two to eight weeks. He states that with good care and treatment 90 per cent. should recover, but if left to themselves 50 per cent. may die.

One severe attack is said to confer a permanent immunity. A mild attack gives but a temporary protection. It is too early to state with any degree of accuracy how effective is the immunity rendered by our vaccinations. However, the results reported by

Manteufel[13] lead us to believe that it will last from one and one-half to two years.

TREATMENT. The vaccine treatment and prevention of contagious epithelioma was first suggested and tried by Manteufel. He also found that serum from hyperimmunized fowls did not have a preventive or curative effect.

Our results with autogenous vaccines have been very encouraging, as the experiments detailed below show. It is advisable to supplement the vaccination with local treatment, especially where the typical white coating appears on the nasal, oral or conjunctival mucous membranes. A small curette has given excellent service in removing the diphtheritic membranes and accumulated pus which cause serious trouble if not removed. The resulting raw surface is then gently swabbed with a 5 per cent solution of potassium permanganate.

EXPERIMENTS WITH CHICKEN-POX. I. *Vaccination Experiments.* The vaccine used in these experiments was prepared by employing pock scabs from the skin and diphtheritic membranes from the nasal, oral and conjunctival mucosæ. Infectious material was ground in a sterile mortar with physiological salt solution. It was then filtered through absorbent cotton and heated in a water-bath for one hour at 55° C. No definite standard has been set for estimating the quantity of virus contained in a given amount of vaccine prepared as above. Variations will occur due to the character of the material used; experience will teach the strength most suitable for use.

No. 1. *Vaccine Treatment of Infected Fowls.* Two pens containing 60 hens which had been removed from various other pens and isolated, because they showed symptoms of chicken-pox, were included in this experiment. 40 of these fowls were injected subcutaneously with 1 c.c. of the vaccine, the others were left for controls. The treatment seemed to have a decidedly beneficial effect, for recovery was much more rapid than in the unvaccinated controls. The disease in the latter ran a longer and more severe course.

No. 2. *Vaccine Treatment of Pox-free Fowls.* The fowls, numbering about 440, in twenty-two pens, were vaccinated with two doses at an interval of five days. Only 4 hens in this lot developed clinical symptoms sufficient to attract notice. It seems probable that one or more of the 4 was infected at the time the treatment was given. This shows conclusively the efficacy of the treatment, for less than 1 per cent. of the vaccinated fowls subsequently developed chicken-pox.

No. 3. *Control Experiment on Vaccine.* 75 white leghorns, in three pens, were left untreated as controls for three weeks after the disease made its appearance in these pens. At the end of this time 26 cases had developed, while treated fowls in other pens were protected 99 times out of 100. All birds then well were vaccinated to prevent the disease from spreading further among these birds, for they were valuable breeding stock.

No. 4. *Experiment with Small Doses of Vaccine.* In this experiment 7 hens were used. 5 were given but 0.5 c.c. of a vaccine which had been prepared by inactivating for only one-half hour at 55° C.; 2 were left as controls, of which 1 developed a mild conjunctival infection after four days. All others failed to show lesions even though kept in an infected pen.

II. *Inoculation Experiments.* An endeavor was made by these experiments to demonstrate the virulence of the virus and the effectiveness of the vaccine.

No. 1. *Inoculations by Feeding the Virus.* 3 susceptible and 2 immune hens—one through natural infection and recovery and one through vaccination—were fed 5 c.c. of virus emulsion by passing a tube down the œsophagus. 2 of the first mentioned developed mild lesions on the oral and nasal mucosæ, and cutaneous lesions on the head, but later recovered. The third susceptible remained apparently normal, as did the "recovered" immune. A small patch appeared after three days on the tongue of the vaccinated hen, but nothing further abnormal was noted and she made a speedy recovery. Both immunes failed to develop the disease.

No. 2. *Inoculations by Introducing Virus through the Epithelium.* 5 hens, 3 susceptible and 2 immune, as were those in the above experiment, were used to demonstrate the results of scarifying the comb and wattles and injecting the virus. All the susceptibles developed typical cases from which recovery was extremely slow. The "recovered" immune showed no lesions whatever, while the vaccinated hen developed a slight catarrhal conjunctivitis, five days after having been infected, which soon disappeared.

No. 3. *Inoculations by Instilling the Virus into the Conjunctiva.* 4 susceptible and 1 naturally immune hen were infected by instilling infectious fluid into the conjunctival sac. Of the susceptibles 3 developed serious eye, nasal and oral lesions, from which they recovered, but the fourth only showed evidence of the disease by a slight throat inflammation which developed after six weeks and was probably secondary. The immune control remained normal.

No 4. *Inoculations by Instilling the Virus into the Nostrils.* This experiment included 6 hens, and was carried out by instilling virus into the nostrils. 3 had been artificially immunized by vaccination and developed no lesions as a result of the infection. The other 3 were susceptible to chicken-pox and showed clinical symptoms in the throat in three, five and ten days respectively. All eventually recovered, but one was markedly emaciated even after two months.

No. 5. *Inoculation by Injecting Blood from an Infected Hen.* One susceptible hen was injected subcutaneously with 2 c.c. of blood from an infected hen. Results were negative.

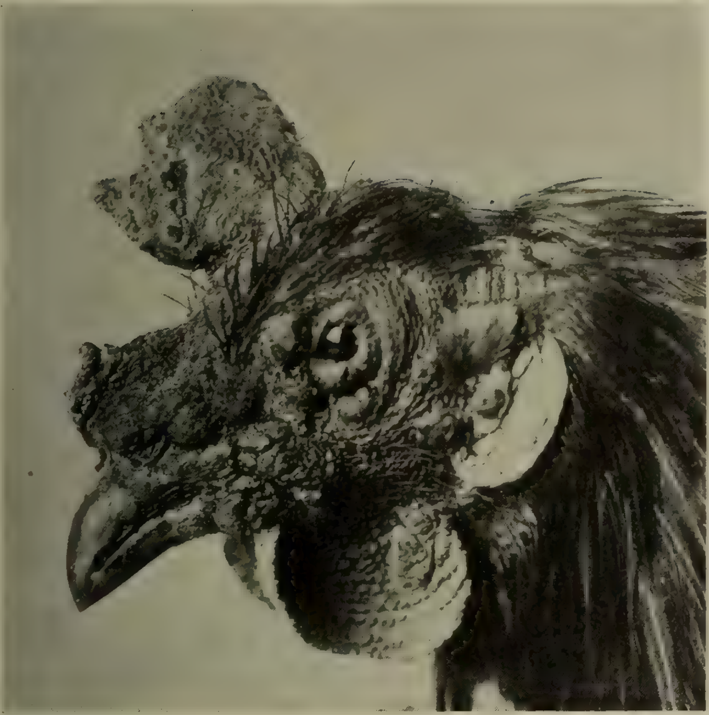
No. 6. *Inoculation by Injecting Pus Subcutaneously.* One susceptible hen received subcutaneously 1 c.c. of purulent material from hens sick with chicken-pox. This bird died suddenly after seventeen days from asphyxiation. Autopsy revealed a mass of pus which completely occluded the entrance to the trachea.

No. 7. *Natural Infection Observations.* (*a*) A game cockerel, susceptible to chicken-pox, was placed in the fattening shed, where the infection had previously appeared, with other roosters which had been vaccinated and were immune. Scratches on the head from fighting became infected and the bird developed a well-marked case, including mouth and throat lesions, from which he died on the twentieth day.

(*b*) A white rock cockerel which had never been vaccinated was placed with treated hens in an infected colony house. He developed a typical case, both comb and mouth symptoms, but finally recovered. None of the hens became infected.

FILTRATION EXPERIMENTS WITH VIRUS. In this work Chamberland filters were used to filter the salt-emulsion-virus which had been prepared in a manner similar to that used in the previously recorded experiments. All bacteria were excluded as was shown by microscopic and cultural tests of the filtrate.

Experiment No. 1. In this experiment 8 non-immune hens were employed. They were divided into two lots of 4 each. One lot was isolated and infected with the filtrate by instilling it into the eyes, nose and mouth. The other hens were used as



A well-developed case of chicken-pox. Note the nodules on the comb, wattles, ear-lobe, eyelid and face.

controls and similarly inoculated with the unfiltered virus. No lesions developed in the hens given the filtrate. One hen in the other lot had a mild attack after two weeks, the symptoms being confined chiefly to one eye.

Experiment No. 2. 6 susceptible hens were employed. 3 were given instillations of the filtrate into the eyes, nose and mouth. The other 3 were used as controls and inoculated with the unfiltered material. The experiments turned out unfortunately, for none of the hens developed lesions.

These experiments with filtered virus are limited and by themselves fail to demonstrate that chicken-pox is caused by a filterable virus because the controls did not develop typical lesions. Possibly the hens had considerable immunity as they were all from one source. Further work along this line is planned and duplicate experiments will be carried out soon.

CONCLUSIONS. 1. An autogenous vaccine has proved successful for the treatment and prevention of chicken-pox. Best results were obtained by two doses. The vaccine is especially applicable in large commercial and valuable breeding flocks when used before pathological changes become marked.

2. The vaccination treatment for chicken-pox was most valuable when used as a preventive, where it was effective in fully 98 per cent. of the cases.

3. One attack conferred immunity. The immunity which resulted from the vaccination is estimated to be effective for one and one-half to two years.

4. It was found impossible to transmit the disease at every attempt due to certain peculiarities of the virus and the fowls. When the attempts were successful, the disease ran a benign course, as it also did in the few cases in which it made an appearance after vaccination.

5. Experiments to show that chicken-pox is caused by a filterable virus resulted negatively.

6. Although the identity of chicken-pox and roup has not been definitely proved, the similarity of these diseases is so great that it seems possible to control roup by vaccination.

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After some announcements by the chairman regarding social events for the ladies the meeting adjourned at 5.33 P.M.

TUESDAY AFTERNOON September 2, 1913

Third Vice-President, H. JENSEN, Presiding

THE CHAIRMAN: Now, gentlemen, we will come to order. We will open the afternoon meeting. The first paper on the program as you see announced is by Dr. McEachran. The Doctor is not here, and so we will proceed with the next paper by Dr. Gay, of Philadelphia, "The Officer's Charger," a paper on the breeding problem.

THE OFFICER'S CHARGER

By Carl W. Gay
Philadelphia, Pa.

Mr. Chairman and Gentlemen: Your program is a little misleading in regard to this particular paper in that I am given a major position which belongs to Prof. Rommel. I was instructed by the Program Committee to consume a very little time and allow the balance of the time for Prof. Rommel. In fact, I was to be something of a curtain raiser, as it were, for him, and he was to furnish the big show.

What I have to discuss this morning is the type that constitutes the charger—not necessarily the officer's charger. The officer is supposed to be superiorly mounted to his men, but on the same general type of horse. This question is worthy of some consideration, on account of the fact that there seems to be no definite ideal as to what constitutes the officer's charger, as evidenced by an inspection of the entries in the charger classes in the horse shows all over the country. The awards in this class have been won by thoroughbreds, half-breeds, saddle-bred horses and by trotting-bred horses, and one year a pure-bred Arabian won the charger class. You know horses could not be thus bred and all be of the same type, which shows us there does not seem to be any generally accepted standard for horses of this charger type.

Perhaps, to understand the type best, we ought to take into consideration just what is required of the troop horse; if we consider his requirements then it seems to me we can form some opinion of what he should be. In the first place, of course, he is a saddle-horse and must have the general essentials of a saddle-horse. The saddle-horse is identified more by his forehand than by any other part of his conformation. He has the longest, most sloping shoulders of any type of horse; his withers are high and extend well into his back; he ought to have forehand enough in front of his rider to keep the saddle back where it belongs; these, with the short top line and the long under line are the general features of the saddle type which characterize the charger. In addition he must be a weight carrier.

You know the ordinary trooper fully equipped rides at what would ordinarily be considered as middle weight. We consider 135 to 165 pounds as light weight, 165 to 190 pounds as middle weight, and 190 to 200 pounds as heavy weight. Ordinary equipment would put the requirements at least in the middle class for the troop horse.

The specifications furnished for the contract buyers call for a horse weighing 950 to 1100 pounds, standing from 15 to 15.3. Now don't get the idea that size is the only essential in a weight carrier. You know it is a fact in the West that a 700-pound pony will carry a 200-pound man with a 50-pound cow saddle all day. We have evidence enough to show that it isn't simply size that makes the horse up to weight. It is more the way he is set up. The short back gives him the short span of the arch, while the short leg and the ample bone determine the strength of the supporting columns. By virtue of these features he is enabled to support weight in a standing position; but when it comes to carrying weight that is very largely the manner in which he works under the load. You have all seen a baggageman in the city, a small wiry fellow, take a big trunk up two flights of stairs and you wondered how he could do it. There is a knack to it. A big man may weigh twice as much and be twice as strong, but he does not know how to get under his load and carry it.

It is the horse who goes within himself, works his hocks under him and keeps the weight all the time supported, the saddle coming up to meet instead of dropping away from the load at each stride, that is a weight carrier.

We want to draw the line between an army charger and a police-officer's mount. There is a distinction. The police-officer's mount and the army charger are two different horses, used in different lines of service. The ordinary police-officer's mount is a horse that supports, while the army horse is a horse that carries weight. Think of a horse standing and supporting a dead weight on his back, as a traffic horse has to for hours at a time, on a street corner. It requires a different kind of a horse than the one who can take up weight at a gallop and perhaps jump with it. We will leave out of consideration the police-officer's horse. He is differently bred.

In addition to being up to weight and handy, as an army horse must be, he has to have a good way of going at a walk, trot and gallop. In other words, he must be a straight-gaited horse. Anything but a straight-gaited horse has no place in a troop, either as an officer's mount or that of the trooper. You can readily understand that a single rider may throw the whole troop out of stride more or less all the time. Those of you who have watched a troop maneuver can appreciate the rhythm into which the horses fall if they are all good, straight-gaited trotters.

In addition to being up to weight, the charger has to be handy. Those of you who have watched army maneuvers know that a horse who is not handy has no place in the ranks. A horse must be light in the forehand, and that means a long, supple neck, a flexible setting of the head, and an easy mouth that will yield itself to the pressure of the hand. You know the center of gravity of a horse standing has been fixed at a point in the median plane of the body well forward. The horse alters that position of the center of gravity by raising or lowering his head and his tail, if he has a tail. The horse that has a light forehand is one who can so set his head and neck that the center of gravity moves backward from the normal position when he is standing.

The cavalry horse has to stand fire. Not only so far as the noise is concerned, but he has, as a rule, actually to stand being more or less shot. Some army veterinarians may be present who have had a great deal more experience than I have, but this point was impressed upon me two years ago. I was dining with an officer of the Cuban army in Chicago. He was an American army officer detailed to instruct the Cuban army in cavalry tactics. In discussing the matter of a suitable mount, one of the points that he made was that the cavalry horse must not be so high-strung that he would not stand actually being hit and still be serviceable. If a horse got shot through the neck, for instance, causing a flesh wound, it should not necessarily incapacitate him for service, yet we don't want a cold-blooded horse.

Everything the troop horse does must be done in company. You know that there are lots of horses that are first-class horses by themselves. Perhaps you have had a speed horse some time that could brush away down the road at a good clip, but he was absolutely useless in company. Everything the troop horse does is done in fours or multiples of four. Also, he has to go on the picket line when off duty, and a horse that won't stand company has no place in the service.

All army specifications call for horses hardy and of dark color. There is a reason for this; uniformity in a troop is essential. There are black-horse troops and gray-horse troops, and so on. White points are also discriminated against, and of course that is in the interest of uniformity in the troop. We know that a horse with dark points in front is more serviceable than a horse with light points. We know, also, that some colors are more or less correlated with hardiness. A conspicuously marked horse would have no more place in the army than a conspicuous uniform.

Cavalry remounts must be hardy, rugged and adaptable, capable of becoming readily acclimated and enduring the hardships and privations of severe campaigning. "Candy" horses won't do.

These are the things that the army horse has to be. There are other points that pertain to the conditions under which he should be produced. In the first place, you cannot recruit horses to mount an army from any one little breeding area. Horses have to be recruited, the same as men, from all parts of the country and upon short notice. That, it seems to me, is important to bear in mind in determining what blood lines we shall use to breed army remounts. I don't think you can advocate any line of breeding that will not be taken up by the farmers and breeders at large. It has got to be a general proposition.

They must be horses that can be produced incidental to some bigger project. The present price paid by the Government does not permit of anyone following this line of breeding simply for the purpose of producing army horses. The price is so low and the margin left to the breeder is so narrow that it does not seem as though anyone would be justified in going into the business of breeding army horses. The supply must come incidentally to the production of horses of some other class; for instance, harness or saddle horses. In producing them there are always some not up to the higher class requirements that may be used for remounts.

Now for the production of horses of this type I hope we may hear from Mr. Rommel.

DISCUSSION

THE CHAIRMAN: Gentlemen, you have heard the address made by Dr. Gay. It is now open for discussion.

DR. TURNER: Dr. Gay says there is no particular type of horse that appears to be agreed upon for cavalry work. Now, of course, it is questionable whether judges of fairs, who judge draft horses, hackneys and horses of that type, know just exactly what is wanted for the mounted service. Some years ago, while in the cavalry service, I made some measurements of horses which were considered ideal chargers. That is, take a cavalry regiment of seven hundred horses, go into each troop and pick out five or ten horses, until you get possibly fifty or sixty horses out of a regiment; then get the opinion of the cavalry officer who has experience, who has been out of the academy long enough to know a horse from a mule, who has chased Indians long enough to know whether you want a thoroughbred horse or a draft horse—and there is considerable difference in the opinions of officers, especially the officer who sits at a desk, is apt to have a very much different opinion of the requirements of the service than the officer who has been chasing Apache Indians two or three thousand miles. I started a system of measurements and, while I haven't these figures here, they were a matter of record fifteen years ago, and it was surprising to see how similar these figures were. Measuring the saddle-bearing surface of the back, the so-called heart girth, the abdominal girth, the height at the withers, measuring the circumference of the forearm and the cannon bone, the length of the forearm, the length of the hock and fetlocks, it was surprising to observe that these fifty horses would measure almost the same. The variation frequently amounted to a half an inch only, and it seemed to me it was perfectly practical to give the measurements of the typical cavalry horse.

At that time veterinarians were sent out as assistants to cavalry officers to buy horses. The specifications seemed to be copied from Shakespeare's description of the horse in *Venus and Adonis*.

Year after year army officers and breeding authorities have been trying to decide what the ideal charger was. I say it was possible to get fifty typical cavalry horses whose measurements did not vary one-half an inch at such points as saddle measurements, abdominal girth, and so forth.

Boards of cavalry officers have gone to Kentucky and purchased three-year-old thoroughbreds, but when you put 175 pounds of man and equipment on them, in three weeks' service they will look like scarecrows. Send an officer who has had frontier service for years. He will buy horses weighing 1000 to 1100 pounds, and he will buy fat horses. There is a vast difference of opinion between these men, who actually know what the requirements of the service are, and some officers who have not seen hard service. We see horses selected by officers who have been in Austria and Germany, and they are frequently the high-bodied type, the three-quarter bred horse. I heard an officer say during the Spanish War that an Italian or Hungarian cavalry regiment could be swung around in better time than a platoon of American cavalry, because their horses had the breeding; but put that high-bred horse down in the mesa country, with nothing to eat but buffalo grass, and this type of European cavalry horse will not come up to American needs. The horse that goes well along perfectly ballasted roads, where they have had good roads for two thousand years, is a different horse from what we need here. Our old cavalry officers who served on the frontier from 1861 to 1876 had the ideal cavalry horse. They had a California broncho that weighed about 1000 pounds. I have seen one of these horses travel eighty miles a day with 200 pounds on his back. A captain of cavalry and his orderly, with two cowboys on cow ponies as guides, started to round up some renegade Indians. The officer rode one of this type of horses one hundred miles the first day and eighty miles the second day, and left the cow ponies exhausted at the end of the first day's trip. That is the type of horse we need in the cavalry, but they have disappeared.

If we can judge the army horse by the cavalry horses seen in the East we have a very poor type of horse in our mounted service.

There is no inducement to breed cavalry horses when the farmer can breed a draught horse that at four years of age will bring $200 to $300. There must be a bonus offered to American breeders to breed cavalry horses, and before he starts a standard type of cavalry and artillery horse must be established by experienced officers.

THE CHAIRMAN: If there is no further discussion on this paper it will be closed.

The next paper on the program, the paper by Dr. Haring, will be put off until tomorrow, and the next paper on the program will be by Drs. Gilliland and Marshall on the "Production of Artificial Immunity Against Tuberculosis in Domestic Animals."

THE PRODUCTION OF ARTIFICIAL IMMUNITY AGAINST TUBERCULOSIS IN DOMESTIC ANIMALS

Written By S. H. Gilliland
Marietta, Pa.
and
Edited in Conjunction with C. J. Marshall
Philadelphia, Pa.

The experiments we are about to report extend over a period from 1900 to the present time. More than four hundred cattle (cows, yearlings and calves), hogs, rabbits and guinea-pigs, were used to obtain the information here presented.

The full report of this work covers hundreds of pages and will be published as a bulletin of the State Live-stock Sanitary Board of Pennsylvania. The time allotted for the reading of this paper necessarily requires us to present only a brief of the various experiments, at all times endeavoring to set forth the salient points upon which conclusions may be drawn.

We believe a concise resumé of these experiments of the State Live-stock Sanitary Board of Pennsylvania will be more interesting and instructive than an attempt to review the voluminous work others have done on this subject, and thereby attempt to draw comparisons. This will be done in the complete publication of the work in the bulletin form above referred to. However, mention might be made of some of the early work done along this line. In 1889 Samuel G. Dixon published in the *Medical News*, October 19, p. 435, "The Possibility of Establishing Tolerance for the Tubercle Bacillus," in which he announced his discovery that avirulent and atypical tubercle bacilli when taken into the normal body disappeared and gave rise to a more or less marked resistance to tubercular infection. This was followed by an article published by Dr. Dixon in the *Medical News*, January 17, 1891, p. 87, entitled "Fluid of Dixon; the Possibility of Checking the Tubercular Process in Man by the Agency of a Metabolic Product of the Tubercle Bacillus," announcing the principle that extracts from the tuberculous bacillary growths injected into the animal economy would prevent the growth of tubercle bacilli that inhabit the tissues, and the result of his experiments upon animals with his water extract of tubercle bacilli.

In 1892 and 1893 Trudeau found that by subcutaneous inoculation of living cultures of avian tubercle bacilli he was able to increase the resistance of a rabbit to infection of living virulent mammalian cultures. He also succeeded in immunizing rabbits to such an extent that when inoculated in the eye with mammalian cultures the first inflammatory reaction gradually disappeared leaving the eye in normal condition, while similar inoculations in control animals led to the destruction of the eye. In 1894, E. A. de Schweinitz, of the Bureau of Animal Industry, reported in the *Medical News* some experiments made upon guinea-pigs in which these animals were inoculated with tubercle bacilli of the human type cultivated upon glycerin beef-broth for about twenty generations. These animals with controls were afterward injected with tuberculous material from a cow. The treated guinea-pigs remained free from tuberculosis, while the check animals inoculated with the same tuberculous material from the cow died of tuberculosis within seven weeks.

In September, 1910, Mohler and Schroeder, of the Bureau of Animal Industry, presented before this Association an article upon the "Immunization of Cattle against Tuberculosis," giving the results obtained by them with the von Behring method, the Heyman method, and the Pearson method. The latter is one suggested by the late Dr. Leonard Pearson in connection with the experiments we are here reporting. They found in a comparison of the methods that $88\frac{8}{10}$ per cent. of the animals immunized by the Pearson method were successfully protected for a period approximately two years, while only $66\frac{2}{3}$ per cent. were successfully protected by the von Behring method. The Heyman and the subcutaneous methods, according to their experiments, gave a much lower percentage of animals successfully protected. Von Behring announced December 12, 1901, that he was engaged in studying the immunization of cattle against tuberculosis and detailed experiments upon several cattle treated with injections of tuberculin and culture of tubercle bacilli of varying degree of virulence and from several sources, and afterward inoculating these animals with tuberculous material or cultures of proved virulence. All of the protected cattle except one were still living when this announcement was made.

Systematic efforts to immunize animals against tuberculosis may be said to have commenced earnestly with the discovery of tuberculin by Koch in 1890. Since this date there have been many investigators throughout the world who have reported the results of their researches in the production of immunity in tuberculosis, and we regret that we do not have time to present to you abstracts of the results of these patient investigators, but will assume that the majority of you are familiar with their work.

We come now to the work conducted by the laboratory of the State Live-stock Sanitary Board of Pennsylvania. In 1902 Pearson and Gilliland[1] published accounts of some experiments made by them upon the immunization of cattle against tuberculosis by the use of a culture of living tubercle bacilli of the human type.

It might be well at this point to describe the culture used to produce the immunity, as it was used in many of the later experiments. It is known throughout all the experiments as culture M, and was obtained from the sputum of a young adult who had a constant cough, though no involvement of the lungs could be detected on physical examination. Smears made for microscopic examination from the specimen of sputum showed an extraordinarily large number of tubercle bacilli. The organism was obtained in pure cultures on dogs' blood serum by the passage through guinea-pigs on October 15, 1899. Microscopic examination of the bacilli revealed them to be irregular in size and shape. Many were curved and some S-shaped. Beading was not marked, and they stained deeply and fairly evenly. This culture at the time it was isolated and for some years afterward was found to be virulent for guinea-pigs in ordinary doses, but not virulent for rabbits, goats or calves.

Preparation of the Vaccine. The method of preparation of the vaccine used throughout all the experiments was practically the same except where otherwise noted. A quantity of tubercle bacilli from a three- to four-weeks-old glycerin bouillon culture was taken, the excess of moisture removed by either blotting between layers of sterile filter paper or drying over calcium chloride in a desiccator for a short time, and then rubbed in a mortar or ground in a flask with bronze balls. No effort was made to get the bacilli perfectly dry, owing to the danger to the operator in grinding them and making the suspension. It was not the object to break up the bodies of the bacilli, but to separate them so that a homogeneous suspension could be obtained. During the process of rubbing or grinding, small quantities of normal saline solution were added from time to time. The suspension was allowed to stand in a cylindrical receptacle until all clumps of bacilli had settled to the bottom, and then the supernatant, homogeneous suspension of tubercle bacilli was decanted off. This suspension was further diluted with normal saline solution until its opacity was equal to a twenty-four-hour-old bouillon culture of typhoid bacilli. This method of measuring the dose suggested itself from the work of other investigators. For a comparison with the work of others the amount by weight of dried bacilli per cubic centimeter of standard suspension was determined. This was done by taking a large quantity of killed tubercle bacilli and desiccating over calcium chloride until perfectly dry. These were then rubbed in a mortar and suspended in normal salt solution until the opacity was the same as the standard vaccine. By this method it was estimated that 1 c.c. of the standard suspension of vaccine contained the equivalent of 0.0013 gm. (1.3 mg.) of tubercle bacilli. This equivalent was determined with a large quantity of dried tubercle bacilli, and the fraction of error for 1 c.c. was infinitesimal.

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[1] Philadelphia Medical Journal, November 29, 1902.

In some of the later experiments the vaccine was prepared by weighing the bacilli after the excess of moisture had been removed by desiccation. These suspensions were prepared so that 1 c.c. represented 1 mg. (0.001 gm.) of dried tubercle bacilli. This was believed to be more accurate than the opacity method.

The vaccine was generally injected within a few hours, or at the most within a few days from the time it was prepared. It was found that some lots of vaccine had a tendency to clump if allowed to stand for any length of time. If the vaccine was not used within a few hours after its preparation it was kept in an ice chest and microscopic and cultural examinations made to determine its sterility.

The first experiment was started November 19, 1900, and the object was to determine whether calves can be infected and to what extent, and in what time by large and repeated inoculations of tubercle bacilli of the human type. A bull calf (No. 26442) was inoculated into the peritoneal cavity with 16 c.c. of a standard suspension of tubercle bacilli of culture M that had remained in a collodion capsule in the peritoneal cavity of a bull for seven months. On March 15 and June 1, 1901, this animal received intravenously 13.5 c.c. and 10 c.c. respectively of a standard suspension of tubercle bacilli, probably of human origin, that had passed through a Coati (Nasua Narica) and were recovered in pure culture by Dr. Theobald Smith in 1895. This culture had remained about one year in a collodion capsule in the peritoneal cavity of a heifer. On August 23, 1901, this animal was inoculated with 20 c.c. of a standard suspension of culture M. The quantity was divided into four parts of 5 c.c. each, and these parts were injected beneath the skin, into the peritoneal cavity, into the jugular vein, and into the lung respectively. These injections were repeated at intervals of seven to ten days, increasing the dose 10 c.c. at each successive injection until January 10, 1902. During this time he received in all 1710 c.c. of a standard suspension of culture M. On January 18, 1902, this animal was inoculated intraperitoneally with 10 c.c. of tubercle bacilli of bovine origin, culture H. This culture possessed a high degree of virulence for cattle as determined by control inoculations.

The animal during the inoculations of the human culture M and subsequent to the injection of the virulent bovine culture H, remained in good condition and apparent good health until it was killed on August 13, 1902. The post-mortem examination revealed a thin layer of partly organized fibrin on the pleura lining the lower half of the chest, the peritoneum covering the abdominal walls, the stomach, the intestines, the liver, and the spleen, as well as the surface of the omentum. The lungs themselves contained a few caseous nodules about one-half inch in diameter, which were surrounded by a thick fibrous wall. These nodules did not seem to be progressive, and appeared to be abscesses indicating the points of injection of the suspension of culture M. The lymphatic glands about the rectum were somewhat enlarged and caseous. There was no other evidence of tuberculosis. It is evident that the human tubercle bacilli used for the inoculation, even in the exceedingly overwhelming quantities, were incapable of causing general tubercular infection.

This experiment led us to believe that cattle were refractory to enormous quantities of tubercle bacilli from human sources and, further, that such injections were capable of greatly increasing the normal resistance of cattle to virulent tubercle bacilli of bovine origin.

EXPERIMENT 115. In March, 1902, another experiment was started to determine more definitely whether cattle could be made more resistant to tuberculosis by vaccinating them intravenously with cultures of tubercle bacilli of the human type.

Four cattle, between twelve to fourteen months of age, were selected for this purpose. They were determined to be free from tuberculosis by the tuberculin test, and were divided as near equally as possible in regard to size, condition, color, sex, etc., into two groups of two animals each. One lot was vaccinated and the other lot was kept under similar conditions as controls.

The lot selected to be immunized, animals No. 45066 and No. 45068, were given seven intravenous vaccinations of gradually increasing dosage from 10 c.c. to 25 c.c. of a standard suspension of culture M between March 24, 1902, and June 2, 1902, as follows:

1902

March 24.	Inoculated into	right	jugular	10 c.c.	stand.	susp.	culture M.
March 29.	"	left	"	15 c.c.	"	"	"
April 3.	"	right	"	20 c.c.	"	"	"
April 9.	"	left	"	15 c.c.	"	"	"
April 23.	"	right	"	20 c.c.	"	"	"
May 20.	"	left	"	20 c.c.	"	"	"
June 2.	"	right	"	25 c.c.	"	"	"

They received in all 125 c.c. of the standard suspension. On July 29, 1902, or fifty-seven days following the last vaccination, the two vaccinated animals as well as the two control animals were injected intratracheally with 10 c.c. of a standard suspension of culture H of bovine tubercle bacilli highly virulent for cattle. The intratracheal method of infection was selected because it furnished a method by which tubercle bacilli could be conveyed to the organs most frequently diseased, and at the same time cause no disturbance of function of important organs and attended with the least degree of trauma.

A vaccinated animal was killed October 4, 1902. A careful autopsy revealed no evidence of tuberculosis in any part of the carcass except a slight fibrous thickening of the wall of the jugular veins at the point of vaccination.

A control animal was killed October 8, 1902, and upon post-mortem examination showed an abscess three-quarters inch in diameter beneath the skin at the point of intratracheal injection of the virulent bovine tubercle bacilli. The mucous membrane of the trachea showed reddish tubercular elevations. The lungs contained caseous tubercular nodules one-quarter inch to three-quarters inch in diameter evenly distributed throughout. One caseous area two inches in diameter was found in apex of right lung. Lymph glands associated with pharynx and thoracic cavity enlarged and caseous.

The second vaccinated animal was killed on October 16, 1902, and was found to be entirely normal except for two hard fibrous thickenings about one-quarter to three-fifths of an inch in diameter at the point of intratracheal injection on July 29. These areas contained no caseous material, but were fibrous throughout.

In brief, the two vaccinated animals contained no distinct lesions of tuberculosis, while the two controls contained widely distributed active progressive lesions.

The second control animal was killed October 16. At the point of intratracheal injection the mucous membrane of the trachea, the lungs and associated lymph glands contained evenly distributed tubercular nodules. The cervical and some of the mesentric lymph glands were enlarged and caseous.

It might be well to state at this time (for it has bearing upon conclusions to be later drawn) that these animals were kept during the entire time of the experiment in a newly constructed barn in connection with the Veterinary Hospital of the University of Pennsylvania. At no time were they exposed to tubercular infection during the period of vaccination.

EXPERIMENT 115 A. This experiment was started in November, 1902, with the object of further determining the immunizing value of intravenous injections of cultures of tubercle bacilli of human origin, and also to ascertain the dosage and the method best adapted to achieve this purpose.

There were 14 yearling heifers and steers in this experiment, 9 of which were vaccinated by various methods, and 5 were kept as controls. All of the animals were determined to be free from tuberculosis by the application of the tuberculin test. Animals No. 45183, a brindle steer, and No. 45184, a black heifer, were given ten intravenous vaccinations between November 27, 1902, and March 2, 1903. The amount of vaccine administered at each vaccination ranged from 10 c.c. to 30 c.c. of a standard suspension of culture M. The interval between vaccinations varied from eight to fourteen days.

The exact dates and dosage are outlined as follows:

1902						
Nov. 27.	Vaccinated in	jugular vein	10 c.c.	stand.	susp.	culture M.
Dec. 4.	"	"	15 c.c.	"	"	"
Dec. 11.	"	"	20 c.c.	"	"	"
Dec. 23.	"	"	25 c.c.	"	"	"
1903						
Jan. 10.	"	"	30 c.c.	"	"	"
Jan. 24.	"	"	15 c.c.	"	"	"
Jan. 31.	"	"	15 c.c.	"	"	"
Feb. 9.	"	"	15 c.c.	"	"	"
Feb. 18.	"	"	20 c.c.	"	"	"
Mar. 2.	"	"	20 c.c.	"	"	"

Following the vaccination of the black heifer, No. 45184, on January 10, she was noticed to be much depressed, the respirations were greatly increased, labored and painful.

These animals were kept during the period of vaccination in a temporary stable in connection with the Veterinary Hospital of the University of Pennsylvania.

On June 16, 1902, three and one-half months after the last vaccination, they were placed with their controls in a pasture with a number of tubercular cows. They were removed from this pasture five months later and stabled with cows with advanced tuberculosis until killed.

The brindle steer, No. 45183, was killed September 7, 1904, one and one-half years from the time the last vaccine was administered. On post-mortem examination this animal showed general progressive tuberculosis of the pleura, lungs, mediastinal and bronchial lymphatic glands, omentum, peritoneum, liver, spleen, as well as the postpharyngeal and mesenteric lymphatic glands. A striking feature in this case was the uniform distribution of the tubercular areas in the lungs. Evidently the tubercle bacilli were carried there by the circulation.

The black heifer, No. 45184, which received the same treatment as the brindle steer, No. 45183, was killed at the same time and a careful examination of all the organs, glands and membranes failed to detect any evidence of tuberculosis except in the posterior mediastinal lymph gland, which contained three caseous, well-encapsulated tubercles the size of a pea. The tuberculin test of this animal prior to entering the experiment shows that she had an after-temperature of 103.2° F., though she was considered at the time to be free from tuberculosis.

It is the belief of the writer that the brindle steer, No. 45183, had a low natural resistance and became infected from the too frequent and too large doses of vaccine. This conclusion is based upon the character and distribution of the lesions in the lungs and other organs. The pathologic picture was one of a mild progressive generalized tuberculosis.

In the case of the black heifer, No. 45184, she either contained a small lesion of tuberculosis before entering the experiment or else the immunity conferred by the vaccine was lost before she was killed, one and one-half years following the last vaccination. Inoculations of guinea-pigs from the lesion found in the mediastinal gland of this animal, proved that the bacilli had a much greater degree of virulence than the culture used for the preparation of the vaccine.

Two more animals, a spotted bull, No. 45185, and a brown and white heifer, No. 16025, were vaccinated three times with a standard suspension of tubercle bacilli, twice with culture M and once with culture U, as follows:

Bull No. 45185.

Nov. 27.	Vaccinated in	jugular vein	10 c.c.	stand.	susp.	culture	M.
Dec. 23.	"	"	20 c.c.	"	"	"	"
1903							
Jan. 24.	"	"	5 c.c.	"	"	"	U.

Heifer No. 16025.

1903							
Jan. 31.	Vaccinated in	jugular vein	10 c.c.	"	"	"	M.
Mar. 21.	"	"	20 c.c.	"	"	"	M.
April 10.	"	"	5 c.c.	"	"	"	U.

It will be noticed that the vaccine for the last vaccination of these animals was prepared from culture U. This culture was isolated by Dr. M. P. Ravenel from the mesenteric gland of a child in December, 1901. It was found to be highly virulent for guinea-pigs, and a six-weeks-old calf inoculated intravenously with it on March 4, 1902, was killed in a moribund condition six weeks later, and showed extensive tuberculosis of lungs, some of the nodules having gone on to the caseation stage. The lymph glands were enlarged and microscopic scrapings from the same revealed enormous numbers of tubercle bacilli. This culture was used for the third vaccination, with the idea that the first two vaccinations with culture M would give sufficient immunity to protect against infection from culture U and a higher resulting immunity would thereby be obtained.

These animals were exposed to natural infection by association with tubercular cows in the same manner as the controls. The exposure with tubercular cows started on June 16, 1903.

The spotted bull, No. 45185, died of tympanites on September 4, 1904, one year and eight and one-third months following the last vaccination. On autopsy the mediastinal lymphatic glands were enlarged and contained caseous material, surrounded by a thick fibrous wall. The posterior mediastinal gland was four inches by six inches, which forced the œsophagus downward, and may explain the tympanites.

The brown and white heifer was killed September 7, 1904, one year and five months following the last vaccination. Autopsy revealed two questionable lesions in the left lung. Three caseocalcareous nodules in mediastinal lymph glands. Three caseous areas one-eighth inch to one-third inch were found in mesenteric lymph glands. Postpharyngeal lymphatic glands enlarged and caseous.

The lesions in both of these animals were well circumscribed and walled off by fibrous tissue. From this and later knowledge obtained it seems more probable to the writer that the vaccination with culture U following so close upon the previous vaccination with culture M was the cause of infection rather than from the association with the tubercular cows.

The fifth vaccinated animal of this experiment received on November 27, 1902, a single vaccination of 10 c.c. of culture M. On January 20, 1903, this animal died of intestinal trouble and must be excluded from the experiment.

The sixth and seventh vaccinated animals, a red bull, No. 45191, and a red steer, No. 45192, received between November 27, 1902, and January 24, 1903, three intravenous injections of culture M and two intravenous vaccinations of culture U, as follows:

1902							
Nov. 27.	Vaccinated in	jugular vein	10 c.c.	stand.	susp.	culture	M.
Dec. 4.	"	"	15 c.c.	"	"	"	"
Dec. 15.	"	"	20 c.c.	"	"	"	"
1903							
Jan. 10.	"	"	5 c.c.	"	"	"	U.
Jan. 24.	"	"	5 c.c.	"	"	"	"

These animals were exposed to natural infection by association with tubercular cows in the same manner as the other animals of this experiment.

The red bull, No. 45191, was killed April 30, 1904. A careful autopsy failed to reveal any lesion of tuberculosis. All organs, glands, etc., were normal.

The red steer, No. 45192, was killed April 26, 1904. Both front knees of this animal had been greatly enlarged for three months, and were extremely painful. The capsules were enlarged and filled with a pink, gelatinous material. Between the two rows of carpal bones the cartilages were eroded.

On further autopsy there was found to be a moderate number of tuberculous deposits in the lungs about one-eighth to one-fourth inch in diameter. The bronchial and mediastinal lymphatic glands were enlarged and contained dense calcareous deposits. The viscera, pleuræ, diaphragm and peritoneum contained a few reddish growths. Microscopic examination of these deposits and growths shows no tubercle bacilli. However, animals inoculated from the lesions developed tuberculosis. A most striking feature was the sharpness with which the diseased areas were marked off from the normal tissue.

The eighth vaccinated animal, a red bull calf, No. 16066, received five intravenous vaccinations of culture M between May 16 and August 5, 1903, as follows:

1903						
May 16.	Vaccinated in	jugular vein	1 c.c.	stand.	susp.	culture M.
May 23.	“	“	3 c.c.	“	“	“
June 12.	“	“	5 c.c.	“	“	“
June 18.	“	“	7½ c.c.	“	“	“
Aug. 5.	“	“	10 c.c.	“	“	“

On July 9, 1903, it was exposed to natural infection of the same degree as the other animals of this experiment.

It was killed on September 7, 1904, after fourteen months of exposure to natural infection. A careful post-mortem examination revealed no evidence of tuberculosis except a calcified nodule one-third inch in diameter in the posterior lobe of the left lung. Guinea-pigs inoculated from this lesion developed tuberculosis in six weeks.

The ninth and last vaccinated animal of this experiment, red steer, No. 20027, received five intravenous vaccinations of culture U between December 1, 1903, and July 14, 1904, as follows:

1903						
Dec. 1.	Vaccinated in	jugular vein	10 c.c.	stand.	susp.	culture U.
1904						
Mar. 17.	“	“	10 c.c.	“	“	“
April 25.	“	“	10 c.c.	“	“	“
June 30.	“	“	15 c.c.	“	“	“
July 14.	“	“	10 c.c.	“	“	“

On July 5, 1904, before the last vaccination, this animal was removed from the temporary barn in Philadelphia to the experimental farm in Delaware county and exposed to natural infection by association with tubercular cows. This animal steadily gained in weight and remained in good condition.

He was killed on December 30, 1905, after one year and a half of constant exposure to infection. A very careful examination of all the organs, glands and membranes failed to show any evidence of tuberculosis, except in the left postpharyngeal gland there was a cheesy focus one inch in diameter. The lesion did not have the appearance of an active one.

The five control animals for this experiment, red steer No. 45186, black bull, No. 45188, black and brown heifer, No. 45168, red bull, No. 45189, and red heifer, No. 45190, were kept under the same conditions as the vaccinated animals and exposed with them to the same degree of natural infection.

Post-mortem notes on these controls are as follows:

Animal No. 45186. Killed April 30, 1904. Tuberculosis[1] of lungs, T T; pleura, T T; postpharyngeal glands, T T; bronchial glands, T T; mediastinal glands, T T T; pericardium, T T T. All the lesions appear to be active and progressive.

Animal No. 45188. Killed September 7, 1904. Active tuberculosis found in left lung, T T; bronchial glands, T T T; mediastinal glands, T T T.

Animal No. 45168. Killed September 7, 1904. Tubercular lesions found in lungs, T T; bronchial glands, T T T T; mediastinal glands, T T T T.

Animal No. 45189. Killed April 30, 1904. Lesions of tuberculosis in lungs, T T T T T; pleura, T T; pericardium, T T; cervical lymphatic glands, T T; bronchial glands T T T T; mediastinal glands, T T T T T; lymphatic glands anterior to heart and below trachea, T T; liver, T T; portal lymphatic gland, T T; omentum, T T; diaphragm, T T. In this animal the disease is rather widely distributed and of an active character.

Animal No. 45190. Killed September 7, 1904. Lesions of tuberculosis found in lungs, T T T; bronchial glands, T T T; mediastinal glands, T T T T; liver, T T T T; diaphragm, T; mesenteric glands, T T.

EXPERIMENT 115 D. This experiment was started with the object of determining the size of the dose, the number of doses and the best interval between the injections of tuberculosis vaccine to produce a serviceable degree of immunity in calves against the disease by natural infection. Thirty calves, ranging in age from ten to twelve weeks, were selected for this purpose; 20 to be vaccinated, and 10 to be used as controls. These animals were purchased in Somerset county, and were received in Philadelphia during a warm spell of weather in July, 1903. They were given a tuberculin test, which was only partially satisfactory, owing to the age and condition of the animals. However, they were selected from apparently healthy herds.

These calves were placed on a pasture in Montgomery county, where they contracted lung worms (Strongylus micrurus) during the period of vaccination, and 12 of the 30 died, leaving 12 upon which vaccinations had been started, and 6 controls. The animals to be vaccinated were divided into four lots.

Lot I. Roan heifer, No. 16081, red and white heifer, No. 16087, and fawn heifer, No. 20002, were given four intravenous vaccinations of a standard suspension of culture M between August 5, 1903, and January 6, 1904, as follows:

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[1] The extent of the disease is indicated by T signs. One T sign means very slightly involved while six T T T T T signs mean extensive involvement of the organ, gland or tissue named.

1903			
Aug. 9.	Inoculated in jugular vein	5 c.c.	stand. susp. culture M.
Aug. 18.	“ “	10 c.c.	“ “ “
Dec. 6.	“ “	10 c.c.	“ “ “
Jan. 6.	“ “	15 c.c.	“ “ “

Lot II. Consisted of two animals, white heifer No. 16089, and brown and black bull, No. 16092. They received between August 5, 1903, and January 6, 1904, five vaccinations of a standard suspension of culture M, as follows:

Animal No. 16089.

1903			
Aug. 5.	Inoculated in jugular vein	4 c.c.	stand. susp. culture M.
Aug. 18.	“ “	8 c.c.	“ “ “
Sept. 10.	“ “	12 c.c.	“ “ “
Dec. 6.	“ “	12 c.c.	“ “ “
1904			
Jan. 6.	“ “	18 c.c.	“ “ “

Animal No. 16092.

1903			
Aug. 5.	Inoculated in jugular vein	4 c.c.	stand. susp. culture M.
Aug. 18.	“ “	8 c.c.	“ “ “
Sept. 10.	“ “	10 c.c.	“ “ “
Dec. 6.	“ “	10 c.c.	“ “ “
1904			
Jan. 6.	“ “	18 c.c.	“ “ “

Lot III. Consisted of three animals—red steer, No. 16080, brindle bull, No. 16093, and red bull, No. 20005. They were given in all five vaccinations of a standard suspension of culture M. The dosage was somewhat larger than for lot II, and was as follows for the three animals:

1903			
Aug. 5.	Inoculated in jugular vein	5 c.c.	stand. susp. culture M.
Aug. 18.	“ “	10 c.c.	“ “ “
Nov. 8.	“ “	15 c.c.	“ “ “
Dec. 6.	“ “	15 c.c.	“ “ “
1904			
Jan. 6.	“ “	20 c.c.	“ “ “

Animal No. 16093 was not in good condition on December 6, and therefore it did not receive its fourth vaccination until January 6, and its fifth vaccination on March 18.

Lot IV. Consisted of four animals—red bull, No. 16079, red heifer, No. 16084, brown and black heifer, No. 16095, and spotted bull, No. 16091. These animals received in all six vaccinations, five of a standard suspension of culture M, and one of a standard suspension of culture U between August 5, 1903, and March 18, 1904, as follows:

1903						
Aug. 5.	Inoculated in	jugular vein	5 c.c.	stand.	susp.	culture M.
Aug. 18.	"	"	10 c.c.	"	"	"
Nov. 8.	"	"	15 c.c.	"	"	"
Dec. 6.	"	"	15 c.c.	"	"	"
1904						
Jan. 6.	"	"	20 c.c.	"	"	"
Mar. 18.	"	"	10 c.c.	"	"	culture U.

At the time of vaccination on August 18, animal No. 16091 had a high temperature and was given only 8 c.c. of vaccine instead of 10 c.c.

These animals with their controls were exposed during the period of vaccination to a moderate degree of infection by association in a pasture with tuberculous cows. Following the vaccinations they were all constantly exposed to infection by being stabled with cows with generalized tuberculosis.

Results of Autopsies

Lot I. Animal No. 16081. Killed December 30, 1904. All organs normal.

Animal No. 16087. Killed April 8, 1905. All organs normal, except pea-sized, well-encapsulated nodule in left postpharyngeal gland, with all the appearances of an inactive lesion.

Animal No. 20002. Killed April 8, 1905. No evidences of tuberculosis could be found.

Lot II. Animal No. 16089. Killed December 30, 1904. No tuberculosis.

Animal No. 16092. Killed April 8, 1905. No tuberculosis.

Lot III. Animal No. 16080. Killed September 15, 1904. No tuberculosis.

Lot III. Animal No. 16080. Killed September 15, 1904. No tuberculosis.

Animal No. 16093. Killed December 30, 1904. No tuberculosis.

Animal No. 20005. Killed April 8, 1905. No evidences of tuberculosis found except in left postpharyngeal gland there is a small nodule one-eighth inch in diameter surrounded by a gray capsule. Guinea-pigs inoculated from this nodule developed tuberculosis.

Lot IV. Animal No. 16079. Killed September 15, 1904. No tuberculosis. Small sections in the lungs show chronic bronchial pneumonia.

Animal No. 16084. Killed December 30, 1904. No tuberculosis. A small greenish nodule found in one of the lungs. Upon histologic examination it resembled a dense collection of lymphoid tissue rather than a tubercular process.

Animal No. 16095. Killed April 8, 1905. No tuberculosis.

Animal No. 16091. Killed April 8, 1905. No tuberculosis.

Controls. Animal No. 16082. Killed September 17, 1904. Early active lesions of tuberculosis were found in the lungs, T T; postpharyngeal glands, T T; mesenteric glands, T T T.

Animal No. 20007. Killed December 30, 1904. Active tuberculosis of lungs T T T; bronchial glands T T T T; mediastinal glands, T T T; liver, T.

Animal No. 20008. Killed December 30, 1904. The lungs contain one small area of suspected tuberculosis which was not proved by animal inoculation. Tuberculosis found in the bronchial glands, T T; and mediastinal glands, T T T.

Animal No. 16086. Killed April 8, 1905. Tuberculosis of the postpharyngeal glands, T T T and omentum. Lungs normal.

Animal No. 20003. Killed April 8, 1905. Active tuberculous processes found in the postpharyngeal glands, T T T and mediastinal glands. No tuberculosis of lungs.

Animal No. 16090. Died February 11, 1905. Was in very poor condition for two months, Extensive generalized tuberculosis of lungs T T T T T; bronchial glands, T T T T ; mediastinal glands T T T T; pericardium, T T; pleura, T T T T T; diaphragm, T T T; postpharyngeal glands, T T T; portal lymphatic gland, T T; omentum, T T T.

The average length of exposure to infection for the vaccinated animals was one year, one hundred and seventy-two days, while for the controls it was one year and one hundred and sixty-six days. In brief, we find only 2 of the 12 vaccinated animals showed any evidence of tuberculosis, and in those the lesions were small and inactive, while all the controls presented lesions of tuberculosis distributed throughout the body. One of the controls developed tuberculosis to such an extent that it died in one year and one hundred and ninety days, showing that the degree of exposure to infection was severe.

Experiment 115 e. This experiment was started with the object of ascertaining the most efficient and safest dosage as well as the minimum number of vaccinations required to produce a serviceable degree of immunity against natural infection.

7 yearling animals were selected for the experiment; 4 of them were immunized, each one differently in regard to size and number of doses of vaccine.

The 3 remaining animals were kept under similar conditions as controls.

All the animals were carefully tuberculin tested at the beginning of the experiment, and found to be free from tuberculosis.

Vaccinations. Animal No. 20012. Red and white heifer, weight 440 pounds.
1903
Sept. 11. Vaccinated in jugular vein 20 c.c. stand. susp. culture M.

Animal No. 20013. Red heifer, weight 446 pounds.
1903
Aug. 6. Vaccinated in jugular vein 2 c.c. stand. susp. culture M.
Aug. 19. " " 20 c.c. " " "
Oct. 10. " " 40 c.c. " " "

Animal No. 20015. Red and white heifer, weight 438 pounds.
1903
Aug. 6. Vaccinated in jugular vein 20 c.c. stand. susp. culture M.
Sept. 2. " " 2 c.c. " " "
Oct. 10. " " 40 c.c. " " "

Animal No. 20016. Red heifer, weight 357 pounds.
1903
Sept. 11. Vaccinated in jugular vein 15 c.c. stand. susp. culture M.
Oct. 10. " " 25 c.c. " " "

Within ten minutes following the injection on October 10 the animal showed great depression, with pulse over 100 and rapid, labored and painful respirations. Animal died in forty-five minutes.

Autopsy revealed an acute, extensive edema of the lungs. This animal was replaced by—

Animal No. 20018. Roan heifer, weighed 372 pounds and received the following vaccinations:

1903
Oct. 24. Vaccinated in jugular vein 15 c.c. stand. susp. culture M.
Dec. 7. " " 20 c.c. " " "

Controls. Animal No. 20014. Solid red heifer, weight 405 pounds.
Animal No. 20017. Small red heifer, weight 375 pounds.
Animal No. 20026. Black and white bull, weight 180 pounds.

These animals, vaccinated and controls, were kept during the period of vaccination and until December 15, 1903, in a stable in connection with the Veterinary Hospital of the University of Pennsylvania, after which date they were taken to the experimental farm of the State Live-stock Sanitary Board in Delaware county, where they were exposed to natural infection by association with tubercular cows.

It was desired to have the exposure as even as possible, and a stable plan was outlined by which each animal was stanchioned alongside of a diseased cow. The animals of the experiment were changed weekly from stanchion to stanchion in regular sequence, the tubercular cows remaining in the same stall. We believed this method would give a more even exposure to infection.

Results of Autopsies. (Vaccinated Animals.) *Animal No. 20012.* Killed May 28, 1906, two and a half years from date of exposure. Weight, 767 pounds. Tubercular lesions found in posterior mediastinal gland, T T; bronchial gland, T T; liver, T T.

Animal No. 20013. Killed January 21, 1906, two years and one month of exposure. Weight, 800 pounds. Tuberculosis of lungs, T T; bronchial gland, T T; mediastinal glands, T T T; postpharyngeal, T T; mesenteric glands, T T.

Animal No. 20015. Killed May 28, 1906, two and a half years of exposure. Weight 746 pounds. All organs, glands, and membranes normal except one mesenteric gland, which contained a suspicious caseo-calcareous mass one-half inch in diameter. No animal inoculations were made to determine if the same contained living tubercle bacilli.

Animal No. 20018. Killed May 28, 1906, two and a half years of exposure. Weight, 790 pounds. The right lung contained a mass one inch by two inches, which on section showed considerable fibrous tissue surrounding collections of pus, one quarter of an inch in diameter, which contained tubercle bacilli. On histologic examination a peribronchial lymphatic node contained a tubercle with beginning caseation and tubercle bacilli. All other organs, glands and membranes normal.

Controls. Animal No. 20014. Killed September 17, 1904. Nine months of exposure. Weight, 610 pounds. This animal was in poor condition. Tuberculosis found in left lung, T T; right lung, T T T; pericardium, T T; left bronchial gland, T T; mediastinal glands, T T T; mesenteric glands, T T. The inferior maxillary bone on the right side was enlarged and discharging pus through a fistulous tract, evidently actinomycosis. There was apparently a double infection of the right lung, actinomycosis and tuberculosis.

Animal No. 20017. Killed May 28, 1906, two and a half years of exposure. Weight, 782 pounds. Lesions of tuberculosis found in lungs, T T; mediastinal glands, T T T T; mesenteric glands, T T T; liver, T; postpharyngeal glands, T T.

Animal No. 20026. Killed May 28, 1906, two and a half years of exposure. Weight, 840 pounds. Tuberculosis of the lungs, T T; bronchial glands, T T T T; mesenteric glands, T T T T; liver, T T T; diaphragm, T T.

It will be seen that all of the vaccinated animals contained lesions upon autopsy. Animal No. 20012, which received only one vaccination, had no lesion in the lungs but in the associated lymphatic glands and liver. Was this animal not protected by one vaccination or was the immunity thus conferred so weak that it was lost before the two and a half years of exposure had expired?

Animal No. 20013, which received a large initial dose of vaccine, followed by a small dose and then a large third dose, was not protected, while animal No. 20015, which received a small initial dose followed by two increasing doses, was protected to a greater degree than any of the others. However, none of the vaccinated animals showed as many or as wide a distribution of lesions as the controls.

Experiment 115 f. In 1903 an experiment was started to prove whether a greater cell resistance could be obtained by using a vaccine prepared from the tubercle bacilli and the toxin liberated by them during their growth on glycerin veal-broth. In other words, to produce in an animal both bacterial immunity and a toxic immunity.

This experiment was not in any way satisfactory, and little can be gotten from the results, though it might be well to here record them.

The vaccine was prepared as formerly described except instead of using normal saline solutions for the suspension of the tubercle bacilli, the glycerin veal-broth upon which they had been grown for six or more weeks was used as the medium. After the suspensions were prepared an attempt was made to kill the bacilli by the addition of phenol or by heat.

7 carefully tuberculin-tested animals were selected for the experiment; 2 of them were kept as controls and the remaining 5 were treated.

3 of the animals, No. 20020, No. 20022 and No. 20024, were injected seven times intravenously with a toxin broth suspension of standard opacity of culture M. The injections extended over a period from September 5, 1903, to June 30, 1904, and the dose ranged from 5 c.c. to 25 c.c. In some of the suspensions used for the injections the tubercle bacilli were killed by the addition of phenol, while in others they were killed by heat.

The remaining two animals selected for immunization, No. 20021 and No. 20023, received on September 11, 1903, one injection of a toxin broth suspension of culture H. This culture is of bovine origin and possesses a high degree of virulence for cattle. To the suspension was added 10 per cent. of a 5 per cent. solution of carbolic acid and allowed to stand thirty-six hours before being injected.

On July 5, 1904, all of the treated animals with their controls, No. 20019 and No. 20025, were exposed to natural infection on the experimental farm by association with badly tubercular cows.

RESULTS OF AUTOPSIES. *Animal No. 20020.* Killed September 19, 1904. Exposure three months. This animal had been blind for some time. Lungs studded with gray, miliary tubercles. No other lesions found in any part of the body.

Animal No. 20022. Killed November 18, 1905. Exposure one year four and a half months. No tuberculosis in any part of the carcass except a small nodule in the right lung near the anterior border of the posterior lobe. Guinea-pigs inoculated from same developed generalized tuberculosis.

Animal No. 20024. Killed December 30, 1905. Exposure one and a half years. In one mediastinal gland and in one bronchial gland there were a few caseous foci found one-eighth to one-quarter of an inch in diameter.

Animals Nos. 20021 and 20023 which received one injection of a broth suspension of bovine culture H, both died within four weeks following the injection. Autopsy revealed an acute miliary tuberculosis. Evidently the phenol had not killed the tubercle bacilli in the suspension in the time allowed.

Control Animal No. 20019. Killed November 18, 1905. Exposure one year four and a half months. Tuberculosis of lungs, T T T T T; mediastinal glands, T T T T T; postpharyngeal glands, T T T T; mesenteric glands, T T T.

Control Animal No. 20025. Killed January 20, 1906. Exposure one year six and a half months. A slight tuberculosis of one lung.

It does not seem possible to draw any conclusions of much value from these results. It seems probable that the toxin in the vaccine may have been a factor in the blindness of animal No. 20020. Was the resistance of this animal lowered by the toxin and it became infected by the vaccine? The exposure to natural infection was only three months.

EXPERIMENT 115 H. This experiment was outlined with two objects in view: (1) to determine the quantity of vaccine prepared from culture M to produce a serviceable degree of immunity against tuberculosis from natural infection; (2) to determine the length of time this immunity is retained by the animal.

30 tuberculin-tested animals were selected for the experiment; 20 were vaccinated and 10 kept as controls.

The 20 animals to be vaccinated were divided into five lots of 4 animals each, and hereafter known as lots A, B, C, D, and E.

The animals of lot A, Nos. 1, 5, 10 and 21, received two intravenous vaccinations of a standard suspension of Culture M, viz.:

1904
Jan. 6. . . . 5 c.c. and twenty days later.
Jan. 26. . . . 25 c.c.

On February 16, 1904, twenty-one days following the last vaccination these animals were exposed to natural infection by being stabled with badly tubercular cows.

Results of Autopsies, Lot A. *Animal No. 1.* Killed December 6, 1904. Nine and three-fourths months of exposure. No lesions of tuberculosis could be found.

Animal No. 5. Killed December 30, 1905. One year, ten and a half months of exposure. Tuberculosis found in mediastinal gland, T; postpharyngeal gland, T T; mesenteric glands, T T T.

Animal No. 10. Killed January 2, 1907. Two years, ten and a half months of exposure. One encapsulated nodule three-fourths inch in diameter in left lung, mesenteric glands, T T; postpharyngeal gland, T. All the lesions well encapsulated and have the appearance of closed processes.

Animal No. 21. Killed January 1, 1907. Two years, ten and one-half months of exposure. Tuberculosis found in lungs, T T; mediastinal glands, T T T; liver, T T T T; portal gland, T T.

The animals of lot B, Nos. 4, 6, 8 and 27, received two intravenous vaccinations of a standard suspension of culture M, viz.:

1904
Jan. 6. . . . 5 c.c. and sixty days later
Mar. 6. . . . 25 c.c.

On March 19, 1904, thirteen days following last vaccination, these animals were exposed to natural infection the same as lot A.

Results of Autopsies Lot B. *Animal No. 4.* Killed January 1, 1907. Two years, ten and a half months of exposure. Tuberculosis found in lungs, T T; left bronchial gland, T; right postpharyngeal gland, T T; mesenteric gland, T.

Animal No. 6. Killed December 30, 1905. One year, ten and a half months of exposure. Tuberculosis of lungs, T T T; bronchial glands, T T T; mediastinal glands, T T T; right postpharyngeal gland, T.

Animal No. 8. Killed January 9, 1907. Two years, ten and three-fourth months of exposure. Lungs normal. Tuberculosis found in left bronchial gland, T; mesenteric glands, T T T; liver, T. All the lesions in this animal were distinctly encapsulated.

Animal No. 27. Killed January 9, 1907. Two years ten and three-fourths months of exposure. One nodule three-fourths by three-eighths inch in left lung. One mesenteric gland contains three perfectly dry calcareous nodules. All other organs normal.

The animals of lot C, Nos, 17, 18, 20 and 25, received three intravenous vaccinations of a standard suspension of culture M, as follows:

1904			
Jan. 6.	Vaccinated in jugular vein	5 c.c.	culture M.
Feb. 16.	" "	20 c.c.	"
Mar. 19.	" "	30 c.c.	"

These animals were exposed shortly after the last vaccination to natural infection by association with badly tubercular cows.

Results of Autopsies Lot C. *Animal No. 17.* Killed January 21, 1906. No lesions of tuberculosis. Normal throughout.

Animal No. 18. Killed December 30, 1905. Normal throughout except small caseocalcareous focus one quarter inch in diameter in left bronchial gland; well encapsulated and in latent condition.

Animal No. 20. Killed January 20, 1907. Tuberculosis found in lungs, T; bronchial glands, T T; mediastinal gland, T T; postpharyngeal gland, T; one mesenteric gland, T. These lesions are very slight, but widely distributed.

Animal No. 25. Killed January 1, 1907. Lesions of tuberculosis found in lungs, T T T; liver, T T T; portal gland, T T T; mesenteric glands, T T; omentum, T.

The animals of lot D, Nos. 13, 14, 23 and 26, received three intravenous vaccinations of a standard suspension of culture M, as follows:

1904			
Jan. 6.	Vaccinated in jugular vein	5 c.c.	culture M.
Mar. 6.	" "	30 c.c.	"
May 8.	" "	40 c.c.	"

The exposure of these animals to tubercular infection started before the vaccinations were completed, though the degree of exposure became more severe shortly following the last vaccination.

Results of Autopsies Lot D. *Animal No. 13.* Killed January 2, 1907. Lungs normal. Tuberculous lesions in mediastinal gland, T T T; bronchial glands, T T; mesenteric glands, T T T; postpharyngeal glands, T T.

All of these lesions are distinctly fibrous.

Animal No. 14. Killed April 24, 1905. No tuberculosis in any part of body. Killed on account of lung abscess due to foreign body from rumen.

Animal No. 23. Killed January 21, 1906. No lesions of tuberculosis of any of the organs, glands, or membranes.

Animal No. 26. Killed January 9, 1907. Lungs normal except for some new-formed fibrous tissue on pleura covering. Tuberculosis of left bronchial gland, T T; mediastinal glands, T T; one mesenteric gland, T; right postpharyngeal, T T.

The animals of lot E, Nos. 11, 15, 16 and 28, received ten intravenous vaccinations of a standard suspension of culture M as follows:

1904						
Jan. 6.	Vaccinated in	jugular vein	10 c.c.	stand.	susp.	culture M.
Jan. 26.	"	"	20 c.c.	"	"	"
Feb. 16.	"	"	20 c.c.	"	"	"
Mar. 6.	"	"	20 c.c.	"	"	"
Mar. 19.	"	"	15 c.c.	"	"	"
April 2.	"	"	20 c.c.	"	"	"
April 15.	"	"	15 c.c.	"	"	"
April 26.	"	"	10 c.c.	"	"	"
May 2.	"	"	10 c.c.	"	"	"
May 8.	"	"	20 c.c.	"	"	"

On March 19, 1904, these animals were exposed to a moderate degree of natural infection, which became more severe after the vaccinations were completed.

RESULTS OF AUTOPSIES LOT E. *Animal No. 11.* Killed July 21, 1906. Lesions of tuberculosis found in lungs, T T; left bronchial gland, T; pericardium, T; costal pleura opposite pericardium, T; mediastinal glands, T T T; postpharyngeal glands, T T; with a connecting abscess back of pharynx. Several lymphatic glands adjacent are firm and caseous.

Animal No. 15. Killed January 9, 1907. All organs, glands, etc., apparently normal from macroscopic examination. Section from posterior mediastinal gland upon histologic examination shows in center of section several giant-cell-like bodies. No evidence of caseation or cellular infiltration. Guinea-pigs inoculated from emulsion of this gland developed tuberculosis. Guinea-pigs inoculated from other organs and glands were normal when killed.

Animal No. 16. Killed September 16, 1904. No evidence of tuberculosis could be found. A few lung worms (Strongylus micrurus) were found in the bronchi.

Animal No. 28. Killed January 9, 1907. No tuberculosis found except in one postpharyngeal gland, which on section contained a thick fluid not entirely characteristic of tuberculosis. Guinea-pigs inoculated from the same developed tuberculosis. Guinea-pig inoculations from liver, spleen, kidneys, lung and mediastinal gland were negative.

The 10 control animals, Nos. 2, 3, 7, 9, 12, 19, 22, 24, 29 and 30, were kept under similar conditions as the 20 vaccinated animals. There were 2 controls for each lot of 4 vaccinated animals. The controls received the same degree of exposure as the animals that were vaccinated.

RESULTS OF AUTOPSIES ON CONTROLS. *Animal No. 2.* Control for Lot A. Killed November 4, 1904. Length of exposure to infection, eight months. General condition bad. Extensive tuberculosis of lungs, bronchial and mediastinal glands. These tissues scored to the extent of T T T T T T, or the highest degree in the scale.

Animal No. 3. Control for Lot A. Killed January 10, 1907. Length of exposure to infection two years, ten and three-quarter months. Animal in poor condition. Tuberculosis of lungs, T T T; bronchial glands, T T T; liver, T T; portal gland, T; one kidney, T; mesenteric glands, T T; postpharyngeal glands, T T T.

Animal No. 7. Control for Lot B. Died May 7, 1904. Two months following exposure. The autopsy notes of this animal were lost, but the physical condition of the animal prior to death was one of tuberculosis.

Animal No. 9. Control for Lot B. Killed January 10, 1907. Length of exposure to infection two years, ten and three-quarter months. Tubercular lesions found in lungs, T T T T; bronchial glands, T T T T; mediastinal glands, T T T T; mesenteric glands, T T; postpharyngeal glands, T T T; superior cervical lymphatic glands, T T.

Animal No. 12. Control for Lot C. Died January 14, 1906. Animal had been in poor condition for some time. Tuberculosis found in lungs, T T T T T. Some of the caseous masses are ten inches in diameter. Bronchial glands, T T T; right postpharyngeal, T T; portal lymphatic gland, T T; mediastinal gland, T T T T T.

Animal No. 19. Control for Lot C. Killed January 10, 1907. Tuberculosis found in lungs, T T; bronchial glands, T T T; mediastinal glands, T T; portal gland, T; mesenteric gland, T.

Animal No. 22. Killed January 10, 1907. Tuberculosis found in lungs, T T T T. Some of the diseased masses are as large as four inches in diameter. Bronchial glands, T T T; mediastinal glands, T T T T; postpharyngeal glands, T T.

Animal No. 24. Killed January 10, 1907. Tubercular lesions found in lungs, T T T; pleura, T T; left bronchial gland, T; posterior mediastinal, T.

Animal No. 29. Died March 7, 1906. Animal had been in poor condition for three months. Coughed badly. Refused grain and had to be assisted to regain feet when down. Extensive generalized tuberculosis of the organs, glands and membranes of thoracic and abdominal cavities; also postpharyngeal glands.

Animal No. 30. Killed January 10, 1907. Tubercular changes found in lungs, T T; posterior mediastinal gland, T; mesenteric gland, T; omentum, T. The disease in this animal was not very extensive.

The exposure of the animals in this experiment to natural infection was as even as possible under the conditions. Each animal was stabled next to a tubercular cow, and at certain intervals these animals were changed in regular order, so that every animal came in contact with all the tubercular cows used for infection purposes.

In analyzing the results of this experiment we find:

1. That the controls were more extensively diseased. The lesions were more widely distributed. Three of the controls died within two years from the time the exposure to infection began, showing that the degree of exposure was rather severe. All of the vaccinated animals lived until killed.

Table I.—Vaccinated Calves.

Animal No.	Dam.	Date of birth.	Vaccinations.				Culture.	Exposed to infection from tubercular cows.	Interval between last vaccination and exposure.	Killed or died.	Post-mortem findings.
			First.	Second.	Third.	Fourth.					
—	Tub. cow, 20036	Aug. 15, 1903	Sept. 10, 1903 1.0 c.c.	Oct. 3, 1903 5.0 c.c.	Nov. 8, 1903 7.5 c.c.	Dec. 6, 1903 7.5 c.c.	M.	From birth	None	Died Feb. 7, 1904	No tuberculosis; bronchial pneumonia due to lung worms.
58	Tub. cow, 20038	Aug. 26, 1903	Sept. 11, 1903 1.0 c.c.	Oct. 3, 1903 5.0 c.c.	Nov. 8, 1903 7.5 c.c.	Dec. 6, 1903 7.5 c.c.	M.	From birth	None	Died Aug. 24, 1906	Mesenteric glands TT. Very calcareous, hard, dry, and encapsulated lesions.
59	Tub. cow, 20035	Sept. 13, 1903	Sept. 24, 1903 1.5 c.c.	Nov. 8, 1903 7.0 c.c.	Dec. 6, 1903 5.0 c.c.	......	M.	From birth	None	Killed Sept. 17, 1904	Left bronchial, T; mediastinal, T. All lesions calcified.
—	Tub. cow, 20037	Oct. 8, 1903	Nov. 8, 1903 1.0 c.c.	Dec. 6, 1903 3.0 c.c.	......	......	M.	From birth	None	Died Mar. 11, 1904	Tuberculosis of lungs, TTT. Mediastinal glands, T. Strongylus micuris in lungs.
62	Tub. cow, 34	Apr. 15, 1904	Apr. 26, 1904 1.0 c.c.	May 25, 1904 2.5 c.c.	June 15, 1904 4.0 c.c.	July 14, 1904 6.0 c.c.	M.	From birth	None	Killed Sept. 17, 1904	Spleen, TTT; liver, TT; portal gland, TT. Evidently prenatal infection. Dam had tuberculous ovaries.
77	Animal, 19	May 21, 1904	June 15, 1904 2.5 c.c.	July 14, 1904 4.0 c.c.	Aug. 11, 1904 5.0 c.c.	......	M.	From birth	None	Killed Dec. 30, 1905	Normal.
92	Animal, 23	June 27, 1904	July 14, 1904 1.0 c.c.	Aug. 11, 1904 3.0 c.c.	......	......	M.	From birth	None	Died Sept. 23, 1906	General tuberculosis.
159	Tub. cow, 110	Dec. 4, 1904	Dec. 11, 1904 0.5 c.c.	Feb. 16, 1905 2.5 c.c.	......	......	M.	From birth	None	Died Sept. 25, 1907	General tuberculosis.
173	Tub. cow, 116	Dec. 27, 1904	Dec. 30, 1904 .5 c.c.	Feb. 16, 1904 2.5 c.c.	......	......	M.	From birth	None	Killed Nov. 2, 1907	Lungs, TTTT; bronchial glands, TTT; mediastinal, TTT.
279	Tub. cow, 36	Feb. 19, 1905	Mar. 16, 1905 2.0 c.c.	May 13, 1905 4.0 c.c.	Aug. 7, 1905 6.0 c.c.	......	M.	From birth	None	Killed Jan. 2, 1907	Lungs, TT; bronchial glands, TT; mediastinal glands, TT; liver, TT; spleen, T; mesenteric glands, TT; Post-phar., TT.
338	Animal, 147	Apr. 13, 1905	Oct. 5, 1905 2.0 c.c.	Dec. 4, 1905 5.0 c.c.	Jan. 24, 1906 10.0 c.c.	Apr. 25, 1906 12.5 c.c.	M.	From birth	None	Killed Jan. 1, 1908	Nodule ⅛ in. in diameter in each lung; nodules $^1/_{16}$ in. in diameter in both bronchial glands; nodule in mediastinal gland. All lesions very dry and encapsulated.
409	Tub. cow, 111	Jan. 3, 1906	Feb. 11, 1906 1.5 c.c.	Apr. 5, 1906 4.0 c.c.	May 28, 1906 6.0 c.c.	July 23, 1906 8.0 c.c.	M.	From birth	None	Killed Jan. 1, 1908	Postmediastinal and left bronchial glands contain tubercular foci $^1/_8$ in. in diameter. So dry and carcareous could hardly cut.

410	Tub. cow, 110	Jan. 5, 1906	Feb. 11, 1906 1.5 c.c.	Apr. 5, 1906 4.0 c.c.	May 28, 1906 6.0 c.c.	......	M.	From birth	None	Oct. 11, 1906	Lungs, T; mediastinal glands, T; postpharyngeal, TT.
416	Animal, 30	Dec. 26, 1905	Feb. 11, 1906 1.5 c.c.	Apr. 5, 1906 4.0 c.c.	May 28, 1906 6.0 c.c.	July 23, 1906 8.0 c.c.	M.	Partial from birth.	None	Killed Jan. 2, 1907	One nodule ½ in. in right lung. One nodule ¾ in. in mediastinal gland. All other organs normal.
418	Animal, 9	Jan. 11, 1906	Feb. 11, 1906 1.5 c.c.	Apr. 5, 1906 4.0 c.c.	May 28, 1906 6.0 c.c.	......	M.	From birth	None	Killed July 31, 1906	A moderate degree of tuberculosis of all organs. Infection believed to be bovine by rabbit inoculation.
424	Animal, 24	Feb. 2, 1906	Feb. 11, 1906 1.0 c.c.	Apr. 5, 1906 3.0 c.c.	May 28, 1906 6.0 c.c.	July 23, 1906 8.0 c.c.	M.	From birth	None	Killed Jan. 1, 1908	Pleura thickened. No tubercles in any part of carcass.
425	Animal, 25	Jan. 27, 1906	Feb. 11, 1906 1.0 c.c.	Apr. 5, 1906 3.0 c.c.	......	......	M.	From birth	None	Killed June 16, 1906	Bad condition. General tuberculosis of lungs and associated glands.
444	Vac. animal, 180	Mar. 4, 1906	Apr. 28, 1906 1.0 c.c.	June 8, 1906 3.0 c.c.	......	......	M.	From birth	None	Killed Jan. 2, 1907	Three caseous foci in one lung about ⅛ in. in diameter. All other organs normal.
449	Tub. cow, 112	Mar. 11, 1906	Apr. 28, 1906 1.0 c.c.	June 8, 1906 3.0 c.c.	......	......	M.	Partial from birth.	None	Killed Nov. 6, 1908	One nodule ¾ in. in lungs; bronchial glands, T; postpharyngeal glands, TT. Lesions latent.
451	Tub. cow, 116	Mar. 16, 1906	Apr. 28, 1906 3.0 c.c.	June 8, 1906 3.0 c.c.	July 20, 1906 6.0 c.c.	......	M.	Partial from birth	None	Killed Nov. 5, 1908	Only lesion is a small nodule in one mesenteric gland.
455	Vac. animal, 20118	Mar. 22, 1906	Apr. 28, 1906 2 c.c. intravenously	June 8, 1906 2 c.c. subcutaneously	July 20, 1906 10 c.c. subcutaneously	......	M.	From birth	None	Died Dec. 31, 1906	No distinct lesions of tuberculosis. Death due to abscess following treatment for lung worms
456	Animal, 20017	Mar. 24, 1906	May 26, 1906 4 c.c. intravenously	Aug. 29, 1906 20 c.c. intraperitoneally	......	......	M.	Partial from birth	None	Killed Nov. 6, 1908	Normal.
661	Tub. cow, 113	Nov. 11, 1906	Apr. 8, 1907 5.0 c.c.	July 11, 1907 10.0 c.c.	Sept. 10, 1907 15.0 c.c.	......	M.	Jan. 5, 1908	4 mos.	Killed Aug. 4, 1910	Normal.
738	Bought from carpenter	Dec. 1, 1906	Apr. 8, 1907 5.0 c.c.	May 22, 1907 7.5 c.c.	July 13, 1907 10.0 c.c.	......	M.	Nov. 6, 1907	3¾ mos.	Killed Aug. 11, 1910	Normal.
739	Vac. animal, 179	Dec. 24, 1906	Apr. 8, 1907 2.5 c.c.	May 22, 1907 5.0 c.c.	July 13, 1907 7.5 c.c	......	M.	Jan. 5, 1908	5¾ mos.	Killed Aug. 5, 1910	Normal.
740	Animal, 145	Jan. 4, 1907	Apr. 8, 1907 4.0 c.c.	May 22, 1907 6.0 c.c.	July 13, 1907 8.0 c.c.	......	M.	Jan. 5, 1908	5¾ mos.	Killed Aug. 4, 1910	Five mesenteric glands slightly enlarged and contain soft, cheesy material. A suspicious condition in udder, not proved to be tubercular, however. Other organs normal.
742	Tub. cow, 110	Jan. 16, 1907	Apr. 8, 1907 4.0 c.c.	May 22, 1907 6.0 c.c.	July 13, 1907 8.0 c.c.	......	M.	Nov. 26, 1908	4½ mos.	Killed Aug. 11, 1910	Normal.

Table I.—Vaccinated Calves (Continued.)

Animal No.	Dam.	Date of birth.	Vaccinations.				Culture.	Exposed to infection from tubercular cows.	Interval between last vaccination and exposure.	Killed or died.	Postmortem findings.
			First.	Second.	Third.	Fourth.					
746	Animal, 60	Mar. 6, 1907	Apr. 8, 1907 2.0 c.c.	June 6, 1907 3.0 c.c.	July 24, 1907 5.0 c.c.	......	M.	Jan. 5, 1908	5½ mos.	Killed Aug. 11, 1910	A few firm, gray, yellowish, distinctly calcareous points in mediastinal glands. All other organs normal.
747	Tub. cow, 112	Mar. 9, 1907	Apr. 8, 1907 2.0 c.c.	July 11, 1907 4.0 c.c.	Sept. 10, 1907 6.0 c.c.	......	M.	Jan. 5, 1908	4 mos.	Killed Aug. 4, 1910	Normal.
748	Tub. cow,	Mar. 11, 1907	Apr. 8, 1907 1.0 c.c.	June 6, 1907 2.0 c.c.	July 24, 1907 4.0 c.c.	......	M.	Aug. 26, 1908	13 mos.	Killed Feb. 7, 1910	Normal.
750	Tub. cow,	Mar. 20, 1907	May 22, 1907 1.0 c.c.	July 13, 1913 2.5 c.c.	Sept. 10, 1907 5.0 c.c.	......	M.	Sept. 30, 1908	13½ mos.	Killed Aug. 16, 1910	Normal.
					Animals Vaccinated with Cultures other than M.						
70	Tub. cow, 42	......	Mar. 17, 1904 2.0 c.c.	June 7, 1904 2.0 c.c.	July 14, 1904 3.0 c.c.	......	Avian culture, P. I. 1	From birth	None	Aug. 25, 1905	Lungs, TT; left bronchial gland, T; mediastinal, TT.
80	Tub. cow, 41	May 17, 1904	June 7, 1904 1.0 c.c.	July 14, 1904 2.0 c.c.	Aug. 11, 1904 3.0 c.c.	......	Avian culture P. I. 2	From birth	None	Dec. 30, 1905	Lungs, liver, and postpharyngeal glands, TT.
446	Tub. animal, 182	Mar. 13, 1906	Apr. 28, 1906 2.0 c.c.	June 25, 1906 4.0 c.c.	......	......	B. I.	Partial, from birth	None	Killed Nov. 5, 1908	Caseocalcareous nodule in one mesenteric gland and one in axillary lymph gland. Inoculation of rabbits shows it to be bovine infection.
448	Tub. cow, 187	Feb. 27, 1906	April 28, 1906 4.0 c.c.	June 8, 1906 20.0 c.c.	......	......	R. R.	Partial, from birth	None	Jan. 22, 1907	Lungs, bronchial glands, T; mediastinal, TT.
450	Tub. cow, 316	Mar. 15, 1913	May 26, 1906 4.0 c.c.	Aug. 29, 1906 20.0 c.c.	......	......	R. R.	Partial, from birth	None	Killed Nov. 6, 1908	Slight infection of posterior mediastinal gland, left bronchial gland, posterior tip of right lung, and three mesenteric glands.
457	Vac. animal, 13	Mar. 24, 1906	Apr. 28, 1906 2.0 c.c.	June 8, 1906 4.0 c.c.	July 20, 1906 6.0 c.c. subcutaneously	......	B. I.	Partial, from birth	None	Killed Nov. 6, 1908	Bronchial glands, TT; postpharyngeal, TT; mesenteric, TT.
498	Animal, 76	June 13, 1906	Aug. 29, 1906 4.0 c.c.	Nov. 21, 1906 20.0 c.c.	......	......	R. R.	Partial, from birth	None	Killed Nov. 6, 1908	Postpharyngeal, TT; left bronchial, T; liver, T.

2. Five of the vaccinated animals, Nos. 1, 17, 14, 23 and 16, showed no lesions of tuberculosis whatever, Animal No. 15 showed no macroscopic lesions, but guinea-pigs inoculated from congested area in the postpharyngeal gland developed tuberculosis. Three of the animals, Nos. 27, 18 and 28, had very slight lesions, in some instances only one-quarter of an inch in diameter.

3. The lesions in the controls were active and progressive, while those found in the vaccinated animals had the appearance of being latent and retrogressive.

4. It is possible that the immunity given the animals in Lots A and B had been lost before they were killed.

5. From the character of the lesions and from later experience the writer believes that the animals in Lots C, D and E were exposed too early, and were at that time more susceptible to infection than normal.

Experiment 115 i. This experiment was started with the idea of rearing a tuberculosis-free herd from the offspring of tubercular cows and the animals used in the foregoing experiments; also to determine the immunizing value of cultures other than M, as well as to obtain further information on the dosage and number of vaccinations required to give a serviceable degree of immunity.

All of the animals used in this experiment were small calves which were the progeny of tubercular cows and other animals on the experimental farm. There were 38 animals vaccinated and 24 animals used as controls. The Tables I and II show the method by which these animals were vaccinated and the time and degree of exposure to infections.

In carefully analyzing these tables we find that all the vaccinated calves that were exposed to infection from the time of birth and during the period of vaccination, contracted the disease, with the exception of two, However, in comparing the autopsy finding of these animals with their controls it will be noticed the lesions found in them were not as extensive or as widely distributed throughout the body. Again, the lesions were of a different character; they were dry, caseocalcareous or calcareous, and in many instances distinctly encapsulated.

It is most interesting to note that the nine animals Nos. 661, 738, 739, 740, 742, 746, 747, 748 and 750 that were not exposed to any infection during the period of vaccination and for some time following, were free from tuberculosis except in two instances, animals Nos. 740 and 746, and in these the lesions were small and not progressive. Is it not possible that the immunity in these two animals had been lost during their three years of exposure?

TABLE II.—Control Calves.

Animal No.	Dam.	Date of birth.	Date exposed to infection from tubercular cows.	Killed or died.	Post-mortem findings.
57	Animal, 20029	......	From birth	Dec. 30, 1905	Generalized tuberculosis.
61	Animal, 10	......	From birth	Nov. 18, 1905	Tuberculosis of lungs, TTTT; mediastinal glands, TTT; postpharyngeal glands, TTT; tubercular abscess back of pharynx connecting with postpharyngeal gland.
81	Tub. cow, 31	June 3, 1904	From birth	Oct. 14, 1906	Generalized tuberculosis including udder.
90	Animal, 16025	June 29, 1904	From birth	June 19, 1906	Tuberculosis of lungs, TT; mesenteric glands, T.
91	Animal, 11	June 29, 1904	From birth	Killed Aug. 26, 1905	Tuberculosis of lungs, TT; bronchial glands, TT; mediastinal glands, TTT.
122	Cow, 45190	Sept. 3, 1904	From birth	Killed Nov. 18, 1905	Lungs, TT; anterior mediastinal, TT; left bronchial gland, TT.
157	Cow, 46	Oct. 17, 1904	From birth	Killed May 12, 1906	General tuberculosis of lungs, bronchial glands, mediastinal gland, mesenteric glands, liver and right femur-tibia joint.
314	Animal, 18	Apr. 8, 1905	From birth	Dec. 10, 1907	Acute tubercular pneumonia of lungs. A few old caseous lesions found in substance of lung tissue.
337	Animal, 193	Apr. 16, 1905	From birth	Died Nov. 8, 1907	Tuberculosis of lungs, TT; mediastinal glands, TTTT; liver, TT; mesenteric glands, TT; postpharyngeal glands, TTT.
407	Animal, 20025	Nov. 28, 1905	Partial exposure from birth	Killed Sept. 2, 1907	Killed in moribund condition. General tuberculosis of lungs, pleura, bronchial and mediastinal glands, diaphragm, pericardium, and postpharyngeal glands. One gland in intermaxillary space caseous.
408	Cow, 184	Dec. 8, 1905	Partial exposure from birth	Killed Jan. 22, 1907	Tuberculosis of lungs, TT; bronchial and mediastinal glands, TT; left postpharyngeal gland, TT.

411	Animal, 185	Feb 4, 1906	Partial exposure from birth	Killed Jan. 2, 1908	General tuberculosis of mediastinal, bronchial, and postpharyngeal lymphatic glands.
413	Animal, 11	Jan. 31, 1906	Partial exposure from birth	Died July 29, 1907	General tuberculosis of lungs, bronchial and mediastinal glands, liver, portal lymphatic gland, peritoneum, omentum, and several mesenteric glands. Also articulation of right foreknee.
414	Animal, 4	Feb. 2, 1906	Partial exposure from birth	Feb. 13, 1908	Extensive tuberculosis of pleura; also lesions in one submaxillary gland.
415	Animal, 15	Dec. 23, 1905	Partial exposure from birth	Jan. 2, 1908	General tuberculosis of lungs, bronchial glands, mediastinal glands, liver, and portal lymphatic gland.
419	Animal, 19	Feb. 6, 1906	Partial exposure from birth	Died May 11, 1906	Cause of death, pneumonia. Lesions of tuberculosis found in bronchial and mediastinal glands.
420	Animal, 10	Dec. 26, 1905	Partial exposure from birth	Died May 3, 1906	Cause of death, intestinal trouble. Lesion of active tuberculosis $\frac{3}{4}$ in. in diameter found in left postpharyngeal gland.
422	Animal, 22	Feb. 6, 1906	Partial exposure from birth	Killed May 12, 1906	Animal was moribund when destroyed. Lungs in pneumonic condition. Lesions of tuberculosis found in the bronchial and mediastinal glands.
428	Animal, 28	Feb. 15, 1906	Partial exposure from birth	Jan. 2, 1908	Tuberculosis of pleura, TTTT; lungs, TTT; pericardium, TT; mediastinal and bronchial glands, TTTT; liver, TT; portal lymphatic gland, T; postpharyngeal, TT.
430	Animal, 20	Feb. 21, 1906	Partial exposure from birth	Jan. 2, 1908	Tuberculosis of lungs, T; mediastinal glands, TT; bronchial, TT; liver, TT; spleen, TT.
745	Animal, 316	Mar. 3, 1907	Exposed after Dec. 27, 1907	Killed June 6, 1910	An evenly distributed tuberculosis of lungs; other organs normal.
749	Animal, 82	Mar. 19, 1907	Exposed after Jan. 5, 1908	Killed June 6, 1910	Tuberculosis of postpharyngeal gland, T; mediastinal glands, TT; lungs, TTT.
757	Animal, 79	Apr. 19, 1907	Exposed after Nov. 6, 1907	Died Feb. 26, 1908	Death due to tympanites. Lesions of tuberculosis found in in lungs and posterior mediastinal lymph gland.
780	Animal, 279	June 16, 1907	Exposed after Dec. 27, 1907	Killed Feb. 13, 1908	Posterior mediastinal gland enlarged on section, caseous throughout. Portal lymphatic gland slightly enlarged and on section caseocalcareous.

All of these 9 animals during the period of vaccination were kept in a stable away from the main herd and fed on pasteurized milk. However, it must be admitted that there was some slight chance of infection through the carelessness of attendants in the handling of feeding buckets, stable utensils, etc.

The results do not indicate that the human cultures B. I. and R. R., and the avian culture P. I., have any greater immunizing power than culture M. The culture B. I. was obtained from the pathological division of the Bureau of Animal Industry, and was non-virulent in ordinary doses for all animals. Culture R. R. was obtained from a package of Tuberkulose—Impfstoff für Rinder brought from Europe by Dr. Pearson. Culture P. I. is avian tubercle bacilli obtained by Dr. Ravenel at the Pasteur Institute in Paris.

Conclusions. Intravenous injections of tubercle bacilli from human sources, non-virulent for cattle, are capable of conferring an immunity in cattle against tuberculosis sufficient to withstand natural infection by association with tubercular cows.

The length of the immunity has not been determined accurately, though it is believed to gradually diminish after two-and-one-half years. It is necessary that the animals, during the period of vaccination and for at least eight weeks following the last vaccination, be kept in a manner that they are in no way exposed to tubercular infection.

The normal resistance of the animal is apparently lowered during the period of vaccination.

The number of vaccinations and the amount of vaccine administered have a direct relation to the degree of immunity conferred.

The interval between vaccinations should be of sufficient length to allow the reaction following the previous vaccination to entirely subside.

The results of the experiments lead us to be hopeful that the day may come when animals can be immunized against tuberculosis in common practice.

Until further knowledge is obtained in regard to the destruction or outcome of the living tubercle bacilli injected in the animal with the vaccine, no practical method for the immunization of animals under ordinary conditions can be advocated.

Acknowledgments. To Dr. Leonard Pearson much credit is due for the original plans of these experiments, and only through his untiring efforts were means obtained from the Legislature by

which it was possible to pursue this important line of investigation. Difficulties arose in the progress of this work that seemed insurmountable, and through the wise counsel, kindly suggestions and encouraging words of this one man the parties in direct charge of the work were stimulated to exert their best efforts.

The writer is deeply conscious of the fact that these experiments could have been presented in a more concise, a more intelligent and a more able manner by the one whose untimely death was a severe blow to the entire veterinary profession. These investigations were originally planned and started by Dr. Leonard Pearson and the writers, who later secured the assistance of a number of men, and to these men we desire to express our thanks:

To Dr. M. P. Ravenel, for the isolation of most of the cultures used in the preparation of the vaccine.

To Dr. C. Y. White and Dr. John Reichel, for the histologic examinations.

To Dr. E. S. Dubler and Dr. John Reichel, for the preparation of the vaccine for the latter experiments and general bacteriological work.

To Dr. E. S. Dubler, credit is due for many of the autopsies, the vaccinations of the animals, and the supervision and management of the experimental farm following 1907.

For general assistance during various phases of this work, we are indebted to Dr. H. C. Campbell, Dr. E. P. Althouse, Dr. E. Barnett and Dr. I. B. Powell.

DISCUSSION

Chairman Kinsley: Gentlemen, you have heard this very able report on the immunization against tuberculosis. Now we wish to have a good, full discussion of it. Who will begin it?

Dr. Winchester: Is there any possibility that in obtaining the organism for immunization from the human source you get a bovine type from the human subject?

Chairman Kinsley: The essayist will please note the question.

Dr. Moore: I am very much interested in this paper of Dr. Gilliland's and the work that has been done by Dr. Gilliland and his associates, but I am not qualified to throw any particular light on the subject. I haven't personally conducted any experiments in connection with immunity in cattle from tuberculosis of sufficient extent to draw conclusions. So far as my observation has been on experiments of others it seems that there is a possibility of procuring a temporary resistance, an immunity that will last for a certain length of time, by the repeated injections of tubercle bacteria of various kinds, but whether this can be made permanent and whether it can be used effectually in combating tuberculosis, it seems to me is still a mooted question.

The other difficulty that comes in with all questions of immunizing animals against a disease of this kind in a generally practical way is that the question of immunity carries with it a meaning to the animal owners that allows them to get away from the precautions that they ordinarily would take, let down the bars and say their animals were immune and they would then take no precautions against infection. While this would be all right if the immunity were complete, if it were only partial in extent or if it were not complete they would simply allow their herds to become infected. I feel that we should be careful about attempting to adopt a method of vaccinating animals against tuberculosis in a permanent way as a means of control until we have sufficient evidence that it is effective. If we could get a vaccine and if we could immunize these animals and make it general, of course it would be a wonderful blessing to the country, but it would be a great misfortune to have cattle owners come to feel that they could immunize their cattle and do away with the natural precautions of preventing infection. I haven't any data by which I could add any further light.

Dr. Schroeder: Mr. Chairman and Gentlemen: I have done a fairly large amount of work relative to the immunization of cattle against tuberculosis. My interest in the subject extends back a good many years and antedates the publication of the important discoveries made by the late Dr. Leonard Pearson and his associates. In fact, I believe an article published by the late Dr. E. A. de Schweinitz, of the United States Bureau of Animal Industry, and myself, in which it was shown that the susceptibility of guinea-pigs for tuberculosis can measurably be reduced by injecting them with tubercle bacilli of a very low degree of virulence, practically innocuous tubercle bacilli, is one of the earliest on record that calls attention to the use of living tubercle bacilli of low virulence as a possible means for the production of resistance against tuberculosis.

In general, the results with my work are so much like those reported by Dr. Gilliland that it is not worth while, directly after you have heard his paper, to say much about them. However, realizing what the facts are and signify, the conclusion drawn by Dr. Gilliland is extremely pleasing to me.

The tubercle bacillus is a curious organism in the sense that it persists in the tissues of animals, once it has entered them, through injection or otherwise, for long periods of time, even when it lacks the degree or kind of virulence required to cause an active or progressive tuberculosis. I have on record a cow into which I introduced tubercle bacilli of the human type of a very low degree of virulence. The bacilli were injected, or rather permitted to gravitate, through a milking tube under a pressure no greater than a column of water from fifteen to eighteen inches high, through one of her teats into her udder, in a way that guarded as effectually as possible against a trauma of any kind. The cow continued to expel tubercle bacilli with her milk for more than six years, of a kind that were not pathogenic for cattle but which caused generalized, fatal tuberculosis in guinea-pigs. She produced and raised two calves during this time and both remained healthy, and showed no lesions of tuberculosis when they were killed and examined post-mortem after they had reached full adult life.

The human types of tubercle bacilli injected into cattle in those methods of immunization that alone are promising, occasionally reach the udder, and when this occurs a slowly progressive, almost stationary tuberculosis develops, which seriously contaminates the milk with tubercle bacilli long before it can be discovered by the most careful physical examination. And, in this connection, we must bear in mind, if all the available data are taken into consideration, no matter what our personal views on the relation between human and bovine tuberculosis may be, that we are forced to look upon human types of tubercle bacilli as a more serious danger for human health than bovine types, and that it is not reasonable to incorporate bacilli which we know to be highly virulent for man in the bodies of food animals in order that the animals may be protected, for economical reasons, against a disease that is caused by closely related bacilli of probably lower virulence for man. In other words, as no known method for the immunization of cattle against tuberculosis is effective that does not require the injection of living tubercle bacilli of the human type, and as such bacilli are often eliminated from the bodies of injected cattle in a dangerous way, and as the immediately available evidence obliges us to conclude that they are the more dangerous types of tubercle bacilli for human health, we should all heartily indorse the conclusion drawn by Dr. Gilliland, namely: Though we know, positively, that a high degree of resistance against tuberculosis can be induced in cattle, we have no method of immunization that can be used, reasonably and safely, in general practice.

Dr. Reichel: I didn't expect to get into the discussion, but I am going to bring out one point that Dr. Schroeder touched upon. I think it is quite clear to men associated with the work that Dr. Gilliland reported, particularly since 1908 and 1909, that the culture injected intravenously would remain dormant in certain animals for a number of years. That was conclusively proved in a test to immunize cattle in which tuberculosis did not exist naturally. After three or four years, they began to develop udder tuberculosis. We succeeded in isolating as we thought cultures of the human bacillus from the udder lesions of six animals during 1908 and 1909. They showed conclusively that human tubercle bacilli will remain dormant for a time and then gradually develop certain virulence for cattle, as has recently been demonstrated. I am quite sure that that in itself brought about the conclusion commented on by Dr. Schroeder. Up to the present time we have no successful or practical method of immunizing cattle.

Chairman Kinsley: Dr. Ward would you add something to this discussion?

Dr. Ward: I have nothing to offer, Mr. President. We have done none of that kind of work in Minnesota. Several years ago we were using von Behring's method, but I regret to say we had very little success with it.

Dr. Haring: I have nothing to say in the way of comment, but I would like to ask a question: In California the amount of tuberculosis in range cattle is becoming a serious problem. On a certain range the amount of infection, between the years 1902 and 1910, in the cattle killed under federal inspection increased from 0.9 to 9.0 per cent. A certain large company has abandoned federal inspection there. Perhaps one of the reasons is because of the amount of tuberculosis in range cattle. I know that in one shipment of range steers 21 per cent. were condemned.

On a certain range that I know of in Arizona cattle presumably free from tuberculosis, when placed on that California range, became so seriously infected in two years that the economic loss from condemnation was of considerable importance. Now I would like to ask Dr. Gilliland if he believes, if he would dare recommend or care to recommend, the bovine vaccination by the Pearson method on these range cattle. Of course they are used for food, but there could be no criticism because of the danger to the public health from the use of their milk, since they are not dairy cattle.

Dr. Higgins: I would like to ask Dr. Haring what he considers the primary cause of tuberculosis in the range cattle.

Dr. Haring: That is a mystery. I do not know. We know it exists. It is something we are working on.

Dr. Torrance: Mr. Chairman I am sorry to say that I have nothing to add to the knowledge of this meeting with regard to this subject. I have been pleased with the very exhaustive report upon these experiments, but I must say I am disappointed with the result of them. It seems that we haven't quite reached any practical method of bovine vaccination, and as far as control work is concerned the very extensive work that has been done gives us I think no assistance.

Dr. Gilliland: In reply to Dr. Haring's question I will say no to the introduction of any tubercle bacilli, whether of bovine or human origin, into milk-producing or food-producing animals, With our present knowledge we are in no way safe in using vaccine on animals we intend to use for milk or food purposes, until we have further information concerning the outcome of the organisms which are introduced into the circulation and remain latent in the tissues. We have a certain amount of knowledge that they do remain latent for a long time, and I am not at all certain where they are remaining latent in the animal tissues, that they are not increasing somewhat in virulence. And first of all we do not know the virulence of those organisms for human beings. We know that they are not virulent for cattle but they are for guinea-pigs. Therefore I think we have no justification whatever for recommending either Von Behring's vaccine or the one I described. The work is as yet in an experimental stage. As I state, I hope the day will come when a practical method can be devised or is devised.

In reply to Dr. Winchester's question:

Dr. Winchester: Whether the organism taken from the human subject might not be of the bovine type.

Dr. Gilliland: I think I will refer that question to Dr. Ravenel whether the organisms taken from the human subject may not be of the bovine type. In this particular instance I think he refers to Culture M.

Dr. Ravenel: Mr. Chairman, in answer to that I think I can say that it is pretty well established that at least 26 per cent. of the tubercle bacilli found in children under sixteen years of age are of the bovine type. This morning I gave that instance of Culture M, as Dr. Gilliland described which never showed anything but human characteristics. Dr. Theobald Smith says it gave him the alkaline bovine reaction and he says it is of bovine origin. I should think there is very considerable danger in introducing cultures of the bovine type obtained from human beings, especially if they are derived, as they most often are, from the mesenteric glands and the related glands of the intestinal tract.

Chairman Kinsley: If there is no further discussion on the immunization against tuberculosis the next paper will be taken up, which is an improved method of preparing museum specimens, by Dr. Day, of Chicago. Gentlemen, let us all remain. Dr. Day has an interesting paper and the paper by Drs. White and Kiernan accompanied by a moving picture demonstration of the eradication of ticks will be given at four o'clock, immediately following Dr. Day.

AN IMPROVED METHOD OF MOUNTING MUSEUM SPECIMENS

By L. Enos Day
Chicago, Ill.

From the time that pathology was first established as a science, teachers and workers in this branch of medical science have endeavored to preserve the tissue so that the pathological changes could be demonstrated in the gross specimen. In order that the specimen may be of greatest value, the color as well as the structure should be preserved, as much depends upon the color in demonstrating macroscopic pathologic changes. The method which preserves the color best without destroying the structure of the tissue is the one desired.

Alcohol of various strengths is probably the oldest substance used in preserving museum specimens. Its use, however, has the great disadvantage of not only shrinking the tissue but of rapidly destroying the color. Some years ago we welcomed with delight the statement that formalin would meet our desires as a preservative for museum specimens. The results, as we all well know, did not meet with our wishes. While it is true that it prevents decomposition, even in quite dilute solutions, it does not preserve the color, causes some shrinking and renders the tissues quite brittle when used alone. It has, however, the advantage of being much cheaper than alcohol.

It was not until Prof. Kaiserling published his method of preserving museum specimens that we were able to preserve the original color in pathologic or normal tissue for any length of time. At the present time I know of no method which preserves the color and structure better than this one. Since this method was first published a number of modifications have been recommended, but none of them has proved to be of any special improvement over the original formula. This method has the disadvantage of being bulky, the specimens having to be placed in glass jars of various sizes which are unwieldy and awkward to handle, especially in class-rooms, and occupy a great deal of space in the museum.

As the specimens become old, or if exposed to the light, they soon lose their bright color. Various molds often grow in the final preserving fluid and destroy the specimen in that way. If one wishes to ship them elsewhere for exhibition purposes there is always the great danger of breaking.

In order to overcome these objections several workers have mounted museum specimens in "Kaiserling jelly" in Petri dishes cemented to plate-glass squares, the "Kaiserling jelly" being made by adding from 10 to 18 per cent. of the best grade of gelatin to the Kaiserling preserving fluid, which will be referred to later.

The pioneer and probably the most successful workers with this method in this country are Watters,[1] Coplin,[2] Albert,[3] Watters.[4] Specimens mounted in this manner are easy to handle, stand shipping well and occupy but little space. They have this disadvantage, however, that the gelatin is not a clear white, becomes darker with age, and is liable to shrink either from the glass or the specimen. This, of course, detracts very materially from the appearance of the specimen.

About fifteen or twenty years ago a method for mounting museum specimens in Kaiserling's fluid between watch-glasses and plain glass squares was perfected in Germany. This method has been kept a secret by those who perfected it. These preparations are bound in a card-board frame covered with book-cloth and are very durable and neat in appearance. Several years ago the writer had the pleasure of examining some of the German specimens and also some that had been prepared in Kaiserling jelly, and was at once impressed with the beautiful appearance of the former as they contained no air-bubbles, the fluid was clear and contained no color. The card-board case used protected the glass background from being soiled when handled. I began at once experimenting in various ways to prepare mounts in Kaiserling fluid, as it appeared to me that it was much superior to any of the various other fluids. After many attempts I succeeded in mounting specimens under watch-glasses in Kaiserling fluid. These mounts retain their color and show relations well, are easy to handle and occupy a very small amount of space, and are permanent. The greatest difficulty experienced was to find an adhesive substance that would seal the watch-glass to the glass square which possessed sufficient elasticity to compensate for the expansion of the fluid during extreme changes of temperature without cracking and allowing some of the fluid to escape. Asphaltum, with a melting-point at about 230° F., was found to meet the above requirements. I have placed mounts cemented with this substance in an incubator at a temperature of 104° F., for forty-eight hours and then exposed the same mounts to a temperature as low as 5° below the freezing-point for twelve hours without any undesired effects.

The method which I have adopted is as follows: The tissues selected for museum mounts are washed lightly in water to remove any blood or foreign matter that might adhere to them. If the specimen is a thick mass it is cut in slices about an inch in thickness and placed in Kaiserling's fluid No. 1 until fixed through, which requires from one to several days, depending upon the size of the tissue and the amount of fluid used. It is best to use plenty of fluid. Care should be taken to place the specimen in the position that it is to assume when mounted. If this is neglected it is liable to become wrinkled and curled and can never be made to look well afterward. If it is desired to mount thin membranes, such as pleura, mesentery, peritoneum, etc., they should be stretched over glass frames before fixing in order to prevent curling. Either glass or glazed earthenware jars should be used for fixing containers, as metal is liable to cause staining. As soon as the tissues are fixed through they are washed in running water for fifteen or twenty minutes to remove as much of the formalin as possible from the surface. They are then trimmed down to the desired size and shape to fit into the watch-glass, and placed in 60 per cent. alcohol until the color begins to return, then they are placed in 95 per cent. alcohol until the color is fully restored. This step must be watched closely, for if they remain too long in alcohol they fade again. As soon as the color is properly restored they are placed in Kaiserling's preserving fluid for a day or two and then mounted. It is always desirable to mount the specimens within a few days after fixing in order to get the best results. Before mounting the tissues are exposed to a negative pressure of about twenty-six inches of mercury for from half an hour to an hour and a half to remove all of the alcohol. If this is not done the alcohol which remains in the tissues produces fading.

Before using the watch-glasses it is necessary to grind them perfectly level. This is done by sprinkling fine carborundum powder on a large piece of plate glass and then pouring a sufficient quantity of water on the powder to make it grind well. The grinding should be continued until the ground surface nearly equals the thickness of the glass. Watch-glasses six inches in diameter are a very good size but larger or smaller ones may be used depending on the size of the specimen one wishes to mount. The glass squares should be made of plate glass three thirty-seconds of an inch thick and seven and seven-eighths inches square for the six-inch watch-glasses. The size of the square glasses should vary in proportion to the size of the watch-glasses if larger or smaller ones are used. Plate-glass squares thicker than one-fourth of an inch are undesirable even for very large specimens requiring watch-glasses seven and one-half inches in diameter. After the glasses are thoroughly cleaned, the specimen to be mounted is placed in the watch-glass and covered with a glass square allowing the watch-glass to protrude far enough to form a lip. The fluid (Kaiserling's preserving fluid) is poured in at this opening until it runs over, then the watch-glass is slipped toward the center sufficiently to close the opening and then set aside in a perpendicular plane to allow the air-bubbles if present to rise. Then the process is repeated until no more bubbles rise when the watch-glass is moved to the center. If a number of mounts are to be made the specimen and glasses may be immersed in a large quantity of fluid, put in place, taken out and set aside as before. If the watch-glasses have been properly ground the glasses adhere so perfectly that the fluid does not escape. After all of the bubbles have been removed the mount is placed on a flat surface with the watch-glass upward and all moisture and greasy substances are carefully removed, then melted asphaltum which has been heated to about 250° F. is poured around the joint between the two glasses. The amount of asphaltum should be liberal and should extend about half an inch upon the watch-glass and an equal distance on the plate glass. After the asphaltum has become cool and set it can be trimmed with a knife and the surface smoothed down with a thick-bladed knife or other metal which has been heated to nearly a red heat. After the melted surface has again become cool the mounts are set aside for a few days to determine if they have been perfectly prepared. If bubbles appear the specimen should be remounted, which is not a difficult task. The greater portion of asphaltum can be removed with a knife and the remainder with xylol or gasoline, as it is very soluble in either of these fluids. If the specimen has remained perfect it can now be enclosed in the card-board mounting. When seven and seven-eighths-inch glass squares and six-inch watch-glasses are used the card-boards should be eight inches square with a circular opening five and three-eighths inches in diameter in the center. They should be about one-sixteenth of an inch thick and of good quality. The upper board should be covered on the top side with bookbinder's cloth and on the under side it should have a piece of card-board of the same size and thickness with a circular opening seven inches in diameter glued to it, thus allowing space for the asphaltum. The cloth should extend about an inch on all sides, allowing sufficient material to paste to the ends and under side. The lower board should be just eight inches square, with an opening the same size as the upper and covered with cloth in the same manner, only that the cloth does not project over the ends. A good quality of glue should be used to fasten the top and bottom card-board securely to the glass and also for holding the cloth over the ends and to the bottom board.

Nearly all text-books pertaining to pathologic technic give the formula for Kaiserling's fluids; but for the benefit of those who do not possess such a work I will give the formula, which is as follows:

No. 1 Kaiserling's Fixing Fluid

Nitrate of potash	15 gms.
Acetate of potash	30 gms.
Formalin	200 c.c.
Water	1000 c.c.

(Alcohol as stated before to restore the color.)

No. 2 Kaiserling's Preserving Fluid

Acetate of potash	100 gms.
Glycerin	200 gms.
Water	1000 c.c.

The preserving fluid should be boiled for five or six minutes before using and allowed to cool to about 80° F. This answers the double purpose of destroying mold-spores and of driving off the most of the absorbed and imprisoned air in the fluid, thereby lessening the danger of bubble formation and subsequent growths of molds.

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2. Coplin. .Jour. Amer. Med. Assoc., August 13, 1904, xliii, 441.
3. Albert. Jour. Amer. Med. Assoc. June 30, 1906, xlvi, 1993.
4. Watters. Medical Record, December 22, 1906, lxx, 988.

DISCUSSION

Chairman Kinsley: Gentlemen, you have heard this paper of Dr. Day, on the preservation of specimens, that we wish to review in our minds, and are very important sometimes. Who will open the discussion? Dr. Burnett?

Dr. Burnett: I haven't anything to add to this discussion. We have seen Dr. Day's specimens of what this is. They speak for themselves.

Dr. Haring: I would like to ask Dr. Day if he knows of a cheaper fluid than Kaiserling's in mounting larger specimens. When a man hasn't very much money to spend for such a thing the cost is considerable. When I was in London I saw a good many specimens mounted in gelatin in a cheap preserving fluid. I got the formula but I have mislaid it. I would like to ask if anyone can suggest anything cheaper.

Dr. Day: I think I can answer both questions at one time. I don't use gelatin at all. I have no use for gelatin in mounting museum specimens. There is always some color and it will shrink, and if it is exposed to any warmth it will become thin. I use nothing but the straight Kaiserling fluid. It isn't an expensive affair to mount specimens in the Kaiserling fluid if you use watch-glasses. It is very expensive if large museum specimens are to be mounted in jars which contain several gallons of fluid. The object of my paper is really to show a method by which we can mount museum specimens by using a very small amount of fluid and at the same time preserve the pathological changes and have them in small bulk so we can handle them well. If there is any cheaper method or cheaper fluid for mounting museum specimens that preserves the color as well, I would like very much to know of it. There are other fluids I have tried but I have never been successful with them. There is a method of using glycerin and chloral hydrate. I have tried this method in a number of ways but I have never been successful with it.

Dr. Higgins: Gentlemen, the method that I have used for some years has been along the line of least resistance. In the work which I was doing it was necessary to devise some means for preserving tissues that were coming in, if a museum were to be established, that would require practically no time in the upkeep. I have a fluid which was originally a Russian preparation. It contains chloral hydrate, formaldehyde and methylated spirits. We prepare a fluid of one part distilled water and two parts of glycerin. To that add 7 per cent. of a fluid composed of three parts methylated spirits and two parts formaldehyde of 40 per cent. strength. Then to the finished solution add anywhere from 10 to 20 per cent. chloral hydrate, according to requirements. Usually we add about 10 per cent. for ordinary tissues.

With that fluid you can put a specimen in a container, let it stay there six months if you want to, and then take the gross specimen out and cut it in any way you wish and then preserve. I have specimens that have been standing in the sun on and off for a couple of years and there is a little fading but not any appreciable amount. For a quick method this is very serviceable. It will not equal, however, the longer method that Dr. Day has described for the smaller specimens.

Dr. Potter: It might be interesting if Dr. Day could tell us how much the glass costs and where it can be obtained.

Dr. Day: The cost for the watch-glass is fifteen cents each. The plate-glass costs twenty cents. The watch glasses that I use I got from E. A. Sargent & Co., but they can be obtained from any house that deals in chemical apparatus. The plate glass, of course, can be got from the Pittsburg Plate Glass Co., or any standard plate-glass manufacturer. They will cut the glass for you.

The card-boards can be made by any manufacturing bookbinder. These I have were made in Chicago at twenty-eight cents each, so that you see that the price of the prepared specimen outside of the labor is not very much.

While I am speaking I might state that I have specimens that have been made up for several years and they have not changed any in the meantime. I have noticed in museum specimens that were prepared in the usual manner in jars that the air that is contained on the top of the fluid, between the fluid and the cover of the jar, is harmful, and probably more harmful, to the specimen than the light. They seem to fade out very fast. If you have jars and keep them perfectly full all the while and have but very little air space the specimens will not fade nearly so rapidly as when you have a great deal of air-space. These specimens that you have prepared didn't fade rapidly because there was no air in them; the air has as bad an effect as the sunlight.

Chairman Kinsley: Gentlemen, the hour has arrived for the paper on "The Eradication of the Cattle Tick and the Development of the Cattle Industry in the Southern States," by Doctors Kiernan and White, of Nashville, Tenn.

THE ERADICATION OF THE CATTLE-TICK AND THE DEVELOPMENT OF THE CATTLE INDUSTRY IN THE SOUTHERN STATES[1]

By John A. Kiernan and George R. White
Nashville, Tenn.

Nature was indeed kind in bestowing upon the Southern States of America a propitious climate for the growing of food products for man and the lower animals.

The same Deity that created man and breathed into his nostrils the breath of life created all other forms of life, even the cattle-tick, which is the basis of these remarks.

Of the ravages of the cattle-tick, both in transmitting disease and in rendering animals impoverished by their parasitic effect, enough has been said; and it is not the purpose at this time to dwell upon the life history of the tick or the disease which it transmits.

Nearly all of the scientific work done in connection with the cattle-tick has been accomplished by veterinarians, most of whom have the honor of being members of this Association.

Of the four leading spirits in the movement of eradicating the tick, two are ex-presidents of the American Veterinary Medical Association, one is the present incumbent and the other is a member whom you are all well acquainted with.

The names of Butler, Dalrymple, Mohler and Cooper Curtice are inseparable with this gigantic sanitary problem. There are many others deserving of great credit for their scientific experiments, lucid writings and practical application of the methods employed in the extermination of the tick. We believe, however, that the greatest credit is due to the man, the veterinarian, who by scientific experiments, practical demonstration, and convincing arguments, has proved to the world that this world widespread tick could be forever extirpated from any farm, field or pasture, from any county, state or nation.

After his labor in working out the life history of the tick, his mind quickly solved the problem of exterminating it. Having inaugurated that movement, he quickly advanced to the development of the cattle industry. He began preaching the discontinuance of the open range, the building of silos, the raising of winter crops to feed cattle, and the selection of pure-bred bulls. His mind encompassed the whole field necessary for the future development of a profitable cattle industry in the southern states. This modest scientist, whom we know as one of nature's noblemen, is deserving of the credit of this nation, and a fitting recognition by this Association. In North Carolina he is known as "Dr. Ticks," but to all of us he is known as Cooper Curtice.

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[1] This paper was accompanied by moving pictures illustrating the subject.

The active campaign against the tick began in 1906, Congress that year having appropriated $82,500 for the work. Forces were organized at Lynchburg, Va., Nashville, Tenn., Kansas City, and in California. Veterinary inspectors were detailed to these branch offices from the various field and meat-inspection forces.

We can all appreciate the many difficulties that were encountered that first year and throughout several succeeding years. No preparation had been made by the people. The newspapers had contained but infrequent articles on the subject, and some states were without adequate legislation, others without any.

In bringing the subject before county boards of supervisors and commissioners we considered ourselves remarkably fortunate if we obtained the services of two or three inspectors at county expense, salaries ranging from $30 per month to $1.50 per day. Most of the inspectors knew nothing of the practical methods to be employed, while state and county inspectors were absolutely in ignorance of all features of the work. It has been our observation, however, that in all branches of industry and science there must be a period of education of the forces employed. Our army engineers learned much from the experiences of DeLesseps' engineers at the Panama canal. McAdoo profited by the thirty years' experience with the engineers in attempting to build the Hudson River tunnel. Fifteen years ago, to build a subway, meant the closing up of every street traversed by the new tube; today the pits are dug and the rails laid seventy feet under ground with scarcely any commotion on the surface. So it was with the tick campaign. It has undergone its evolution and is now proceeding along modern progressive lines.

There is a good deal of liberty taken at times in trying to anticipate the people's sentiment before doing one's sworn duty. In our experience we have learned to be skeptical of the public official who undertakes to enforce laws and regulations by trying to keep his finger on the public pulse for guidance.

In six years the supreme courts of four states have stamped their seal of approval upon the laws enacted for the control and eradication of the cattle-tick. We venture the assertion that in areas in which the campaign has been pursued there is no law upon the statute-books that has been enforced as successfully as the live-stock sanitary law. Absolutely no claims of credit are made. It has been enforced, without fear or favor, against the rich corporation which violated the big cattle-man who violated, and the little cattle-dealer who violated. Recourse to law has never been adopted in this work, to our knowledge, however, except in cases of extremity, after all other means of accomplishing the end proved futile.

The work has the good-will of every railroad, cattle-breeder, and intelligent person in the southern states. Since August, 1906, almost 200,000 square miles of area have been freed of the cattle-tick and released from quarantine. That is approximately, over one-fourth of the entire original tick-infested section. The cost of eradicating the tick is about 50 cents per head. The immediate benefit in increased valuation of each animal is not less than $5 per head. As a large part of the expense is borne by federal and state departments, and the balance spent out of county funds, the actual cost to the individual farmer is practically nothing.

A county containing 20,000 cattle may start tick eradication in March, and by June every owner who desires to ship cattle to market can obtain not less than $5 per head more for each animal than he could before the work was undertaken. Such a county would probably spend $2000 in eradicating the tick during that year, and the actual enhancement in value of the cattle in that county would be $100,000. That advancement in the resources of the county, however, is only the smallest feature of the benefits to be derived. These cattle raised under tick conditions are scrub-nondescripts worth on an average from $15 to $17. Their owners have not obtained much revenue, and as long as they can raise cotton they don't want to raise cattle, because, as they say, "It doesn't pay." From the day tick eradication starts a new spirit enters every individual of that county. There is a natural spirit of enterprise. There is a love for live-stock inherent in the good farmer, the desire to improve the cattle. Pure-bred bulls are purchased and in a few years the average value of these cattle has increased 50 per cent. and in many cases more.

The man who had only one cow is raising two cows. The county that formerly had 20,000 cattle valued at $15, now has 40,000 cattle, valued at $25 per head. Better bulls are bought and the average value further increased. Each farmer has a pasture and a barn lot. In the barn lot heaps of manure accumulate, which are hauled to different parts of the farm. The yield of cotton increased 100 pounds per acre, valued at $12. The yield of corn increases from 20 to 60 bushels, and the yield of oats 50 per cent. The farmer builds a silo, improves his barn, gets in a telephone, running water, a bathtub, piano, graphophone; the boys and girls stay at home; the roads are improved, the schools are modernized, the county assumes the air of prosperity and the people the spirit of contentment. We hear from such counties time and time again, and the county officials and the people tell our men, "Tick eradication is the greatest work in the upbuilding of a county that was ever introduced."

The following is a sample of the people's estimate of tick eradication:

"I take great pleasure in stating that the progress made in the eradication of the cattle-ticks in Bradley county, Tenn., is entirely satisfactory to all the people of the county. We have rid our county of all the ticks with the bare possibility of one farm for the year 1912. There were no deaths or sickness for 1911.

There is no one in Bradley county who would dare make an unfavorable criticism of the good work and results of the complete work. To say that everybody is delighted with the eradication of the ticks is to put it mildly.

The price of cattle has more than doubled. The first eight months after we got above the quarantine line, our people sold and shipped between $30,000 and $35,000 worth of cattle for more than twice the former price. The interest in live-stock has had a great uplift, since we can raise and keep our cattle with the certainty of their living to maturity, and to an age to justify a profit on their raising. Our county is being filled up with better breeds of cattle, none of which have died. This could not be done before 1907, the beginning of our work. Our people cannot estimate the full blessings of this, the greatest aid the United States Government has given the people of the South. Money would be no inducement to us to go back to the conditions of 1906. It has been more to Bradley county than any other blessing that has come in the last fifty years.

JUDGE BROWN."

Senator John Sharp Williams, known throughout the length and breadth of the land, said, "If you succeed in eradicating the cattle-tick you will have done more good than all Congressmen and most Presidents." Senator Williams was one of the first cattle-owners in Yazoo County, Miss., to build a dipping-vat. Nearly all other methods for eradicating the tick have given way to the modern concrete dipping-vat, containing arsenical solution, a parasiticide advocated also by a member of this Association, Dr. Mayo, of Virginia.

We started in by greasing cattle by hand, and now we are using machinery, as it were. By persevering, consistent work it was possible for four or five negroes to grease 40 to 50 cattle in one day, and it required industrious supervision of their work to see that all parts of each animal were reached by the dirty, grease rag. Today, in one of our twenty-six-foot concrete vats, we can dip 1200 to 1500 cattle, and we know that when they swim through the solution every part of the body and every tick has been reached.

In the early days of the work we visited farm to farm, sometimes spending an hour or more in one pasture looking up the cows, driving them to a pen and then disinfecting them. Today we locate and build dipping-vats about five miles apart, and all the cattle-owners drive their cows to the respective vats, every fourteen days for dipping. Those that don't come we go after, and a $300 fine usually prompts them to keep their appointments in the future. The number of dipping-vats necessary in a county depends upon its size and the number of herds. We have some counties with more than 150 vats each. The arrangements for the location and construction of dipping-vats are certainly interesting subjects. When the government sends an inspector into a county to do tick eradication work it pays his salary and part of his actual expenses. He is expected to eradicate the tick. The Bureau of Animal Industry does not contribute a dollar toward the construction of the 50 to 150 concrete dipping-vats that are necessary for any of the counties. These vats probably cost on an average $50. About $15 of the expenses are borne by the county boards, the balance by the people of the neighborhood in which the vat is built. We think this is a pretty fine illustration of coöperation, when the people of each county can be banded together to furnish money, material and labor for the construction of the vats for their mutual benefit, at a cost of probably $5000.

We have in mind the zealous coöperation furnished by the people of several counties in Mississippi, in which vats were being constructed during the early months of this year. It was necessary to haul the cement twenty miles over as bad roads as exist anywhere in the country. Thirty sacks of cement are required for each dipping-vat, and for each lot of cement for a vat three teams were started for the railroad point to carry back ten sacks each; frequently it was necessary to use all six horses to pull one wagon out of a hole in what was supposed to be the road. These people were undaunted by such trivial obstacles. In forty-five days they had completed 60 dipping-vats. They were put in active service and have been used continually throughout this season.

We think you will all appreciate the class of men that is required to organize and carry on the work to a successful termination. We are quite certain that in no class of live-stock sanitary control work that has been undertaken by the federal or state government has there been made a better showing of the hearty coöperation of the people than has been obtained in this work.

There has been no agent to coerce the people of the South into stamping out the tick. The cattle have had access to the markets for immediate slaughter. The parasite has existed beyond the memory of any living being. They were not afraid of the disease transmitted by the tick, for their native cattle were partially immune, and there was no sanitary law compelling them to clean up.

In view of these facts, we are constrained to accept the view that the people of the southern states accepted the recommendations of the United States Department of Agriculture and the Departments of Agriculture of the respective states, as policies that would mean the development of the farm and the development of the entire quarantined area.

Dr. White (at the conclusion of the illustrated lecture): I will just say, in conclusion, gentlemen, in reference to what was brought up yesterday in the enforcement of laws and regulations, that in six years those states have taken up these matters before the supreme court and in five southern states in which tick eradication is being conducted, the supreme court has found the laws and regulations valid. Whatever success the people are making in the eradication of the tick in that territory is through the means of just laws and strict enforcement of them.

(Vice-President Jensen returned to the chair).

The Chairman: Gentlemen, don't leave now. We are going to have a very interesting discussion on this paper.

Dr. Slason: I have been requested by a veterinarian who is not here now, Dr. Monsell, of Florida, who had to leave last night, to ask a few questions for him. He said down there they are shipping tick-infested cattle to Oklahoma. Sometimes they don't know that they are infested, but when they get there they have to be dipped according to the laws. They dip them once before shipping and after getting there they are dipped once more. They find the mortality in the cattle that are shipped immediately after dipping is greater than if they had not been dipped at all. The mortality occurs on the way. He wanted to find out what was the cause of that greater mortality in cattle that have been dipped once before being shipped. They find they are having a great deal of trouble in eradicating the tick, that the people don't do any work in certain sections and they don't respond to the work of the officials. So that is a question that he would like to solve. The mortality is usually in cattle three or four years old, and not necessarily in the younger stock, and now he would like to find out whether it is due to the dipping or whether it is due to arsenic poisoning or something of that kind.

Dr. Kiernan: The Balkan war has created a great demand for canned beef. Now the packers don't want to put nine cent steers in canned beef and they were looking for a cheaper class of beef-producing animals and then sent buyers down into the southern states to purchase everything that they could get. They went into Florida and they contracted for 200,000 or 300,000 cattle. They go to a man and they buy everything that he has, cows, bulls and calves, covered with ticks. The cattle have been coming into Montgomery, Alabama, after a long time on the road. They dip them there and mix them up a good deal, and load them into the cars and ship them out. Most of them are emaciated animals, unfit for food. And it is the opinion of some people that they should not be permitted to be sold for food; that they should be condemned. Many of them were cows which if fed and used for breeding purposes and crossed to pure-bred animals would produce calves worth twice as much as the mother. Now Florida has 660,000 head of cattle. The average value of cattle in Florida is less than in any state in the Union, and that's where they are getting these cattle from, a non-desirable class of cattle, emaciated, not used to being handled, shipped in cars when they are hot, and they die. The losses are very severe. That's where the accidents come in the shipment of those cattle. They are emaciated and not a desirable class of cattle.

Dr. White: If these cattle were shipped without any dipping the mortality would be almost as great because they are not physically able to stand the trip.

Dr. Kiernan: Now on this Lespedeza Farm they bought 300 head of such cows as are shipped now for slaughter. Those cows cost $12.00 a head two years ago. They bred them to pure-bred bulls, and last year they exhibited the calves at the fairs, and in November one of those calves in particular weighed 900 pounds, and they refused nine cents a pound for him—out of a $12.00 cow. Now those people are shipping cattle from a state where they have less cattle per square mile than any state in the Union, where the average value of the cattle is less than any state in the Union. They ought to be shipping cattle in. But the prices paid at the stock-yards have attracted that class of cattle. What we are trying to do is to counteract the movement of those cattle from that territory; interest the people in keeping those cattle there and raising more cattle and better cattle. In Florida no work of tick eradication has been done and that's where the majority of cattle have been shipped from.

Dr. Slason: The veterinarian whom I mentioned is connected with the state, and they are trying to do some work in that direction. Of course if that is the case with the cattle down there it seems that they are trying to get all they can out of it. And the principal reason that they brought up that question of the mortality, whether it was greater after dipping, is that when they get to a certain point they have to pay a feed bill for about ten days. It has happened twice in that same place. But it wasn't encouraging to them to have that mortality, and they wanted to know the reason for it.

Dr. Kiernan: We are sorry they don't have to pay three feed bills and stay thirty days instead of ten days; then they would do something.

Dr. Eagle: Mr. President, speaking of the mortality in the shipment of dipped cattle, I believe I supervised the dipping of a shipment which up to that time went the farthest of any dipped cattle in this country. While in the B. A. I., I supervised the dipping of 41,000 head in Hicks, Texas. These cattle were freed from ticks for the purpose of stocking ranches in Wyoming, North Dakota, Montana, and some were shipped to Virginia. I was interested in the mortality of dipped cattle and I kept careful notes of all the shipments. With each shipment we sent a man along to report just how the cattle arrived, and when the final reports were made on the 41,000 head, the mortality was less than is generally incurred through a regular shipment.

The Chairman: They were very likely good, strong cattle in the first place, weren't they, Doctor?

Dr. Eagle: No, sir, some of them were shipped from the state of Durango in Mexico, had been on the road a week or so, and had been bumped around the road two weeks on account of the revolution down there, before we got a chance to dip them. If an animal is going to die from shipping, they will die whether dipped or not. Perhaps some of them will die from the results of the dipping but it depends on the way they are handled after the dipping.

Dr. Kiernan: And before, too?

Dr. Eagle: Before they were shipped from Mexico it seemed to me that they had everything that would tend to weaken them before going through the vat. They got to the border once or twice, but they couldn't get them over and they played checkers a while, and finally got them out of Mexico and brought them up into Hicks, Texas, which is a two days and a night run from the border. We generally watered them and let them have a day or so rest and then put them through the vat. This year they have shipped over 60,000. This man is in Pennsylvania that is shipping them and he is stocking many farms with these cattle.

Dr. Potter: I can speak from experience as to the value of tick eradication. Dr. Kiernan has shown you pictures of Lespedeza Farm. I had the supervision of tick eradication in Fayette County in the old days when they attempted to do it by hand, by rubbing the cattle with a cupful of grease and a little rag. This particular farm was a thorn in the side of the authorities who had to deal with tick eradication in that section. The foreman of that farm at that time was very much opposed to the work, and about all we could get him to do would be to feed a little salt and sulphur to the cattle. That the feeding of sulphur would kill ticks was a fallacy that had crept into the minds of nearly everyone. The cattle on that farm were in very poor condition and thin and they were getting very little results from them, in marked contrast to conditions as shown by these pictures. Another man in that section, a poor negro, told me of the value of tick eradication. Another government inspector had been there the year before and had required them to clean up. This negro said, "I saw that I had it to do anyway, and I thought I might as well do it thoroughly, and I went to work. That year my cattle were poor and of little value. The grass was good and the water was good. This year on my pasture with the same conditions of grass and water, but without the tick, my cattle are thrifty and in good condition." And they were fat and sleek as you most ever see in that class of cattle. I think that showed conclusively the value of getting rid of the tick.

Dr. Kiernan mentioned one of the state authorities there speaking of tick eradication and politics. Now in the old days politics and tick eradication didn't go very well together, and I used to illustrate it to them in this manner: I said, "Politics can be divided into two words, polly and ticks. Polly means many, and ticks means just plain ticks. When you mix politics and tick eradication you have many ticks."

The Chairman: This completes the program for today, gentlemen. I will be very glad to see you here tomorrow afternoon.

Adjourned at 5.15 p.m.

Thursday Morning, September 4, 1913

SYMPOSIUM

Sections on Medicine and Surgery participating.

(Dr. Charles H. Higgins in the Chair)

The Chairman: The first paper this morning in this section is one on "Municipal Meat Inspection," by Dr. F. G. Cook, of Paris, Texas, who I believe is not present. There are several of these papers on meat inspection.

The next paper will be one entitled, "Meat Inspection in the United States," by Dr. Thomas Castor, of the Bureau of Animal Industry, at Philadelphia, Pa.

MEAT INSPECTION IN THE UNITED STATES

By Thomas Castor
Philadelphia, Pa.

Meat inspection in the United States has made remarkable progress in the last quarter of a century, and is a subject that is still growing in importance to the meat-consuming public and to the veterinary profession, as is evidenced by the continued and repeated references to it in the public press of the entire country and by the increased facilities that are provided at the various colleges for the study of this and allied branches, to the end that thoroughly competent, well-equipped scientific men may be provided to devote their time and knowledge to this important work. It is a broad problem requiring a large amount of scientific knowledge as well as practical common sense, and must be conducted in such a manner as to give a satisfactory guaranty to the consumer that he is being given a safe, wholesome article of food.

The history of meat inspection need not be gone into at any length in this paper. Its beginning dates back to the time of Moses, when it was recognized that some regulation of the meat traffic was necessary for the protection of the public, although at that time the scientific knowledge of disease was lacking. Since then the work has advanced in efficiency along with the increase of our knowledge of disease, until at the present time it has become a highly specialized line of work, carried on in a scientific manner by well-educated and thoroughly trained men.

This inspection of meat is necessary because food-producing animals are subject to a variety of diseases, which, although they may impair or destroy the wholesomeness of the meat for human food, are often not discernible in the dressed carcass, so that the only way to determine the diseased condition and thus to pass proper judgment on the meat is by means of expert examination at the time of slaughter, as otherwise meat carrying germs of a dangerous disease may be placed on the market and be purchased and used for food by the innocent, unsuspecting consumer. It is also necessary in order to insure cleanly methods of handling and preparing meats and their products to guard against adulterations, both harmful and fraudulent and to guarantee truthful labeling of all the various meat-food products that are offered to the public for consumption.

Meat inspection can be divided into three classes or divisions: (1) federal inspection, (2) state inspection, and (3) municipal inspection.

The federal inspection was first inaugurated in the United States as an ante-mortem inspection to protect the live-stock interests by the eradication of contagious diseases from among food-producing animals, especially contagious pleuropneumonia, which at that time (1884) was gaining quite a foothold in the United States; but after a few years it was found necessary to broaden the work to include a post-mortem inspection of the animals at the time of slaughter in the large packing centers.

The greatest factor in this early inspection was a commercial one, with the idea of guaranteeing to foreign governments the healthfulness of our meats, and to overcome the almost prohibitive restrictive measures that were being instituted by the various European countries, beginning with Italy in 1879, and which were becoming more general and almost intolerable, especially after the discovery of contagious pleuropneumonia among the cattle of a few of our eastern states.

The first federal meat-inspection law, that of August 30, 1890, simply provided for inspection of cured pork at the time it was boxed or packed for export, but took no account of the conditions or health of the animals at the time of slaughter; so it was without effect in lessening the onerous foreign restrictions against our meats. Its inadequacy was soon recognized by the authorities and by the people of the United States, who were becoming more interested in the subject of meat inspection, owing to the concentration of the slaughtering business in a few large cities, and the danger to public health that was brought to their attention by stories of sensational writers, who in many cases made exaggerated or unfounded statements concerning the abuses that existed at the slaughtering centers. Consequently, on March 3, 1891, a more effective law was enacted by Congress, which gave authority for both ante-mortem and post-mortem inspection of food animals intended for export or interstate trade, for microscopic inspection of pork for export, the stamping of inspected and passed meat, and the labeling of meat products prepared therefrom.

The Bureau of Animal Industry was given charge of the enforcement of this act, and from the small beginning made in May, 1891, when federal inspection of export beef was inaugurated in the old Eastman & Company abattoir in New York City, only a few blocks from where we are meeting on our Golden Anniversary, it has steadily increased in magnitude, both as to the number of animals inspected and the number of packing houses under inspection. Under the able leadership of that honored scientist, Dr. D. E. Salmon, the first chief of the bureau, and his able, broad-minded, practical successor, Dr. A. D. Melvin, the history of federal meat inspection in the United States has been one of continual advancement from that time until the present, when we have without doubt a meat-inspection service that is unexcelled by any in existence.

The good effects of the law of 1891 were soon apparent, and after a few months of its operation the various European governments commenced to remove or lessen their restrictions against our meats, so that our export meat trade began to increase and to regain its former magnitude and importance.

Unfortunately this law did not give the citizens of the United States all the protection that was desired or intended, as the bureau was not able to secure appropriations from Congress sufficiently large to provide inspection at all of the abattoirs that were shipping meat in the interstate trade, nor could it furnish inspectors to all of the plants that were making urgent requests for federal inspection, consequently large amounts of uninspected meats were regularly shipped in the interstate trade without any restriction whatever.

Meat Inspection Law of 1906. The law of 1891 did not grant any authority to the bureau to supervise the processing of meats or their products nor to make or enforce regulations concerning sanitation, but the department, early in 1906, assumed authority not conferred on it by law and proceeded to issue orders demanding cleanliness in all parts of the packing houses as a requirement for the continuance of federal inspection. Considerable progress was being made along that line when the new meat inspection law of June 30, 1906, was passed by Congress. This law gave us for the first time in our history the necessary authority and funds to inaugurate a real, effective meat-inspection service and it was consequently welcomed by the bureau, as the limitations of the old law had long been recognized by those in authority, and numerous unsuccessful attempts had previously been made by the Department to secure the needed legislation and funds to carry on the work properly.

The sensational articles concerning packing-house conditions that were printed and circulated over the entire world at that time were of course helpful in stirring Congress to action, although the stories as told were in many cases greatly exaggerated or were only half truths told in such a manner as to give a false impression of the actual conditions. These published articles are discussed quite freely in the Annual Report of the Bureau of Animal Industry for 1906, where it is also shown that the criticisms applied largely to conditions at packing houses over which the Department had no authority to remedy under the law at that time.

The law of 1906 broadened out the work of the Bureau and gave the required authority to accomplish many of the necessary reforms in the packing houses doing an interstate business, and also in the methods and scope of inspection. The task confronting the bureau during the interval between the passage of this law and the time of its enforcement was stupendous, as it was necessary to look after and to supervise the alteration and remodeling of packing plants and slaughterhouses over the entire country in the short space of three months, so that they would comply with the federal regulations concerning sanitation, light, ventilation, toilet and dressing-room facilities, etc. The members of the inspection force had to learn many lessons in regard to packing-house construction before being able or qualified to give satisfactory advice and instructions to the proprietors of the plants requesting federal inspection, as these packers came to the Bureau for information in regard to all sorts of subjects concerning packing-house construction and equipment with the view of removing or remedying existing objectionable features, so you can readily believe that many hours of deep thought and consideration were given to that subject by those in authority.

In some of the plants the required alterations had not been completed at the time specified for the law to become effective, —October 1, 1906, as it was found to be a physical impossibility to finish the work of remodeling in the short space of time allotted to get ready for its enforcement, but where the improvements were progressing satisfactorily, and the owners or managers gave us assurance that the work would be pushed to completion without delay, inspection was allowed to be inaugurated, as it seemed unjust to close up plants or to practically ruin their business when everything possible was being done by them to comply with the new regulations.

There have been some sharp criticisms in regard to the action of the bureau in these cases, especially from certain professional agitators, to whose accusations I will refer later, but after all the results obtained have proved the wisdom of the course adopted, as the remodeling and rebuilding work done was of a far better and more permanent nature than could have been possible if rushed through to completion in too short a time, or if the bureau had been satisfied with temporary patching up. This work of remodeling and rebuilding the packing plants to meet the ever-increasingly stringent sanitary requirements has been and will still be a continuous process whereby the older and more antiquated buildings one by one are being abandoned for new plants, either in whole or in part, each one of which shows a decided advance in packing-house construction; and if records had been kept of the expenditures for this work since the passage of the new law, the figures would be astounding in their vastness. In Philadelphia, where I am more intimately acquainted with the conditions, the amount so expended will run far beyond the million dollar mark, and the same story is true all over the country, but the end has not yet been reached and every year will show more improvement in the sanitary construction and equipment of our packing houses.

The organization of the bureau employees has also advanced in efficiency, knowledge and uniformity of procedure, for we can look back to those early days when the work was in its infancy and when the inspectors were political appointees, more willing to render political service or to attend to outside business than to soil their hands or clothes by actual packing-house work, but we saw a great change occur in July, 1894, when all of the employees of the bureau were placed in the classified service, and from thenceforth only competent, intelligent men were certified for positions by the United States Civil Service Commission. The incompetents were gradually weeded out of the service, until we obtained a well-organized, thoroughly trained body of men in the inspection service, each one being imbued with the importance of his work and proud to be a part of the meat-inspection system which is not excelled by any similar system in any country in the world. This improvement in the federal force has been largely due to the strict enforcement of the civil-service rules, which place all employees entirely on a merit basis and absolutely free from any outside influences, either political or otherwise, thus giving them a free hand to perform their duties in an unbiased manner.

It does not seem advisable to attempt to describe in this short paper the technic of the inspection service nor to carry you along through the various steps from the ante-mortem inspection to the head inspection, to the visceral inspection, to the inspection of the split carcass on the hanging rail and to the final inspection, for this can all be obtained from the bureau publications, especially Circular No. 125, "The Federal Meat-Inspection Service," written by Dr. A. D. Melvin, chief of the bureau, which can be had upon application. The bureau also gives you a cordial invitation to visit the official establishments of this city or of your home city, so as to study the subject at close range, and in any such visits you can always feel assured of a cordial reception at the hands of the officials.

Suffice it to say, the work of post-mortem inspection has likewise shown a continuous improvement, as in the early days the inspector depended largely on viewing the carcass and viscera at a more or less long range, during which he was only likely to find the aggravated or extensively diseased conditions, while now he makes a minute examination of each carcass by palpating the viscera on specially arranged tables or trucks and by cutting into the more important lymph glands to locate lesions that may be too small to be readily seen or even felt; and finally viewing the entire dressed carcass to make certain that nothing has been overlooked. There are also special methods of procedure, such as incising into the heart and the muscles of mastication in all cattle killed, in order to detect the presence of *Cysticercus bovis* cysts in the muscular tissue; the examining of the peritoneal and kidney fat of hogs to detect the presence of kidney worms and their accompanying pockets of pus, etc. You can realize, therefore, that the present post-mortem inspection is a highly technical and very complete examination, but at the same time it is a practical system and proceeds by progressive steps so that the skilful, experienced inspector can make these examinations very rapidly and at the same time with unerring accuracy without delaying or impeding the killing operations. This rapidity of action has sometimes been criticised, but is no more remarkable than is the accuracy and speed which is attained by skilful, experienced persons in many other lines of work.

In addition to the examination for diseased conditions, the present federal inspection includes supervision and inspection of meats and meat-food products during all stages of curing, rendering, canning, etc., during which any unsound, tainted, contaminated or otherwise unfit meat is rejected for food purposes and is destroyed under direct supervision of a bureau official.

The inspectors are required to see that sanitary equipment and methods are used in the handling of meats and their products; to prevent the use of harmful chemicals or preservatives in meat, or the use of false or misleading labels upon the same. As a further protection to the consumer, frequent samples of meat products, spices, pickles, etc., are taken at irregular intervals, without previous notice to the packer, in order that they may be subjected to chemical analysis in one of the several laboratories of the bureau.

Statistics regarding the meat-inspection work are published in the annual reports of the bureau and cover the ground thoroughly. These reports are public documents which may be easily obtained upon application to your representative in Congress, and in passing it may be well to note that they contain so much information of interest and value that every veterinarian should have them in his library for reference and study. Reference to these statistics will reveal to you the magnitude of the bureau inspection work, both as to the number of animals slaughtered under inspection and the amount of meat-food products prepared at official establishments. But it must be remembered, however, that the federal authorities have jurisdiction only over the interstate and export trade and over the plants doing that class of business; although when inspection is inaugurated at a plant the entire output is supervised and inspected irrespective of where it is to be shipped, and thus the federal authorities are continually inspecting a great amount of meat that is sold direct to the local trade, which assists and lightens to a considerable extent the labors of the local health authorities.

State and Municipal Inspection. This brings us to the other classes of inspection, viz., the state and the municipal inspection, which I will mention but briefly. There have been various estimates regarding the amount of meat consumed in different localities that is not inspected by the federal authorities, and in Pennsylvania it has been said by those in a position to know that about 50 per cent. of the meat consumed was not so inspected. At any rate the percentage is high, and if our system of meat inspection is to be complete and satisfactory it is necessary for the federal work to be supplemented by an efficient state and municipal service, so that all of the animals slaughtered and meats prepared in the local slaughtering and packing plants and by the farmers may be properly inspected, for it is in the plants where there is no federal inspection and where official supervision of local inspectors is either entirely lacking or is inadequate that we very often find conditions that are unsanitary and frequently revolting in their character.

The necessity for adequate local inspection, both state and municipal, will be more forcibly impressed upon your minds when you stop to consider that it is a common practice to sort food animals in the stock-yards and also at the farms and country shipping points, so that those which have the appearance of being diseased are separated out and sold for slaughter at plants where no federal inspector is stationed and where, as a rule, no other inspector will be found, as the shippers have learned by experience, that this method gave them better financial returns, for in that way the carcasses, even if diseased, could in most cases be sold and utilized for food instead of being condemned and made into fertilizer, as would be the case if an inspector had an opportunity to pass upon them.

It will be readily understood how this can be the case when you stop to think that the great majority of the states have no system of inspection whatever, and those which do attempt it are as a rule so inadequately supplied with inspectors that the men cannot possibly cover the large amount of territory assigned to them. For instance, in Pennsylvania we have only ten state meat inspectors to cover the entire area of that great state outside of the few cities having their own inspection service, so about all we can expect of them is to look after some of the worst plants and to clean up or eliminate the pest holes, and it is a pleasure to say that they are doing this in our state.

The same statements will hold true with regard to the ordinary city inspection. There are many of them which make no attempt to inspect the meat supply, and in most of those which do, we find the number of inspectors entirely too small to properly cover the ground. For instance, in Philadelphia, until quite recently, we had only six local inspectors to cover about one hundred and fifty slaughtering plants, in addition to several thousand butcher shops and meat stalls.

The farmer butchers also need looking after, for many of their plants are not up to the standard expected of them from a sanitary point of view, and again the farmer or his butcher is usually a poor judge as to the freedom from disease of the animals he slaughters. The popular idea that farmer meat and country sausage is preferable to any other kind is often a mistaken one, especially when we consider the present high standard required in the modern packing house and the strict supervision of them and their products that is maintained under federal supervision.

After considering these conditions from every point of view, it appears that the only system by which we can ever secure thoroughly satisfactory meat inspection in a community is to supplement the federal inspection service with the establishment of municipal abattoirs, one or more according to the requirements, where all of the slaughtering could be conducted, excepting only that which is done in plants covered by federal inspection, and in that way the inspection can be performed in a satisfactory and efficient manner by a reasonable-sized force of inspectors, as it is doubtful if the ordinary city can ever supply sufficient funds to provide enough inspectors to thoroughly supervise the slaughtering at the considerable number of small, widely separated plants that are usually found operating in most cities. This municipal abattoir system is not an experiment, but has been tried out extensively in Europe and also in a number of cities in the United States, where it has given satisfactory results, both financially and otherwise. Unfortunately many cities and towns pursue the opposite policy and prohibit all slaughtering within the corporate limits, thus depriving these plants of benefits of the city water and sewage systems and forcing the slaughter houses into the rural districts where they are beyond any jurisdiction of any local officials, leaving the butchers to do about as they see fit, both in regard to sanitation and the disposing of diseased carcasses.

In establishing local inspection, either in a municipal abattoir or otherwise, it should be the aim to use the federal regulations and methods as models so far as possible, both for the sake of uniformity of procedure and because they are very generally recognized as the standard, having been formulated from the results of long experience and after careful consideration and study by experts who are thoroughly familiar with the scientific aspects of the diseased conditions which are found in our food animals and with the regulations in force in other countries, and who are also familiar with every detail of packing-house work and methods of procedure.

In conclusion it may be well to say a few words about some of the criticisms that have been and are being made against the federal service, its efficiency and its methods of procedure, as people will naturally inquire of their veterinarian for information concering a subject of this kind with which he is supposed to be familiar. These denunciations during recent years have emanated mainly from certain professional agitators who are gaining much personal newspaper advertisement, and, if reports are true, financial gain from the promulgation of stories against the Bureau of Animal Industry, and veterinarians should be interested in this matter for two reasons: First, because it is their duty to know whether the health of their families and neighbors is being properly protected by the federal officials at the abattoirs under government supervision and who are being paid out of the public funds which they help to provide; and, second, as professional men veterinarians should be very much interested in guarding the good name and reputation of their brother veterinarians, who have been the subject of these unwarranted attacks.

As early as October, 1909, charges were made at the meeting of the American Public Health Association at Richmond, Va., that the Bureau of Animal Industry regulations concerning the disposition of carcasses of animals that were slightly affected with certain diseases did not comply with the intention of the law nor properly protect the public health, but after careful consideration the executive committee of that association of representative medical men decided that the charges were without foundation.

Again in the spring of 1912 the same subject was brought before Congress, and the Committee on Agriculture held an extended hearing, but after listening to the testimony of the accusing witnesses, and none for the defence, they decided that nothing of sufficient importance was brought out to warrant or justify an investigation or any other action on their part.

Notwithstanding these facts, the same denunciations have been reiterated on numerous occasions lately in public speeches and in various magazine articles from the same source, but they are now commanding comparatively little attention, as the public appears to be viewing them in their true light and to be satisfied that it is entirely a "muck-raking" campaign, and the present opinion of most thinking people is that the "muck-raker" is not engaged in that business because of any special calling, but rather because the work pays.

If time and your patience permitted I would like to take up this matter more in detail and show you how unreliable and exaggerated or distorted are the statements made, and to give you a little of the record of some of the witnesses who came before the committee, but I believe enough has been said to assure you that your professional brethren and others engaged in the great organization comprising the United States Bureau of Animal Industry are living up to the high ideal expected of them and that they and their work are worthy of your continued confidence and support.

In closing I will repeat, for the sake of emphasis, a subject that has already been mentioned, for it is the keynote to successful meat inspection in this country, and it is this: That our energies and efforts should be exerted toward improving and extending the state and municipal inspection work so as to bring it as nearly as possible up to the standard of the federal service, in order that those who eat home-dressed meat may receive the same protection as is now afforded to the consumer of meats bearing the "U. S. Inspected and Passed" stamp which has been shipped to them from plants doing an interstate business.

DISCUSSION

The Chairman: Gentlemen: you have heard the paper. It is now open for discussion. Dr. Eagle, will you discuss this paper?

Dr. Eagle: Mr. President and Gentlemen: I was greatly interested in the subject of meat inspection for about twelve years. I followed the meat inspectors' work in the United States, but today I am on the other side of the fence. However, even if I have left the Bureau of Animal Industry, I want to state one thing, and that is, that my interest is almost as great as it was before leaving the service. I shall not attempt to review the points which have been brought out by the essayist, but I want to take this time and opportunity to compliment him on the way in which he has presented the subject. If I were talking on the subject of meat inspection I should say that the average practising veterinarian knows little about meat inspection. I would not say that to be critical, but I would bring it to you as my personal observation. The federal inspector or veterinary inspector, or a state or municipal meat inspector, who is a veterinarian, does not generally hold the respect of the veterinarians in his vicinity, or rather, perhaps I should say, that it has been that way in the past.

Now the subject of federal meat inspection, as I have stated, has been well presented by Dr. Castor, but there was one point that was emphasized by the essayist, that is, the need of laws to supplement the federal inspection where its jurisdiction ceases. We have been priding ourselves in this country on having a meat-inspection system inferior to none, but what have we beyond federal inspection? We know that there are certain European countries which have a system of meat inspection that goes down into the provinces and into the municipalities, and an inspection of the meat is made which is detailed and thorough. In this country, while it is true that we have the federal inspection established by the United States Government, which is good so far as it goes, yet only about 60 per cent. of our meat receives such inspection. We are without the additional inspection necessary to make the sanitary supervision of meat and food products in this country complete—that is, state and municipal inspection—and we will not have good, thorough state and municipal inspection until the average practising veterinarian is interested enough in this subject so that he will coöperate, not only through other veterinarians, but also with local boards of health to the extent that he will arouse such sentiment as will bring about the enactment of local or state legislation which will make these requirements what they should be. I had an opportunity while in the service of working with some people who were greatly interested in this matter, and you would be surprised to see how some states, such as Texas, are far in advance over some of the slower communities, especially in taking up sanitary problems, such as milk and meat hygiene. After that system was established it was not very long before quite a number of the municipalities of the state had adopted ideas of improvement of meat inspection, and put in force ordinances which effectually covered the subject, and of those cities which were referred to by the essayist, you will find that most of them are in the state of Texas. If we are going to get effective regulations for meat inspection in our cities, the veterinarians must assist, but they cannot at this time do it alone. If the veterinary profession of this country does not become more interested in these measures, it will soon have to step back and permit the physician to handle this subject, and thus put the veterinary profession in a secondary place, not only with reference to state and municipal inspection, but possibly also in the national service. Of course, I am speaking not only with reference to wholesome meat food products, but also regarding such measures as are needed for the production of good, sanitary milk, but there is another side of this subject, and since I have been called upon to speak, I will refer to it. We cannot expect to get very far until we have authority which will place some of the expense of operating the meat inspection service upon the fellow who is responsible for most of the necessity for inspection. While I was on the inspection work, I only knew of one state that was carrying on work of this character and that was the State of Pennsylvania. There is a large field for improvement. When a man who is responsible for the production of unwholesome meat or meat products is made to bear his share of the loss from such products, he will very soon improve the conditions.

There is one point which should be brought out here while we are trying to overcome many of the problems connected with sanitary meat, and that is we are not doing anything to reduce the amount of the meat supply that is being constantly thrown into the market from local centers which is practically in an uninspected condition. I think the necessity for an enlarged meat inspection will not be necessary in the future if we can get proper laws and regulations to put part of the loss due to inspection upon the fellow that is producing that kind of diseased meat. If you will call upon a few of the federal inspectors they will tell you that when they tell a farmer that he has a herd of tuberculous cattle, or that he has sent in a high percentage of tuberculous meat, that it is very hard to get him to take measures to stamp out the disease or toward cleaning up his infected premises. If you will go into some of the large packing houses in this country (and that is about the only place where you can go to see it) which are under the supervision of the United States Government, you will wonder who is standing the loss for all of this condemnation which goes on. While, of course, the corporation running the business does not very often get any sympathy, still the loss has proved very burdensome. You go into some of the establishments and see from 15 to 20 per cent. of the total kill hung up for being infected with tuberculosis, and you will not wonder why it is that the selling price of meat has gone to the high figure it has. It seems to me that the time has come when farmers raising stock should realize their responsibility and should stand some of the expense made necessary by the condemnations of carcasses, and until the man who produces these tuberculous animals is made to stand some of the expense of the federal condemnations, this trouble is not going to grow less. We have got to adopt a policy of conservation. I believe at this time that the federal inspection is already facing a policy of conservation. They have progressed rapidly in the meat inspection, and have got to the point where I believe they will have to start state conservation of the food supply of this nation; otherwise, there is going to be a great shortage in this country. Many cattle are already sent to the market which ought not to be slaughtered for food, and we find thousands and thousands of cattle that are now being sent to the killing floor, bringing a price which would not have been thought of five years ago. Take hog cholera which has become so prevalent, especially in the Middle West. It is taking off thousands of hogs in the Middle West and elsewhere. All of these things are going to bring about a shortage of the supply, and even now we find that the American people are going to foreign countries in order to get meat for the United States. In addition, I think you will find that the present Congress will remove the tariff. With all of these things ahead of us, the policy in the future must of necessity be toward conservation of our meat supply.

Dr. Richardson: Mr. Chairman, I don't think I have anything further which would add to the interest of this discussion. I know that there is a great deal to do in order to bring up meat inspection to where it ought to be in places where the government inspection does not reach. There are twenty-eight private houses in Toronto in the care of four inspectors. The city of Toronto has at the present time under construction several abattoirs which will be run on highly sanitary lines, and that is going to add a good deal. Just as soon as these abattoirs are completed the Provincial House of Parliament will grant to the city the privilege of passing a bill for the regulation of the plants so that they will be inspected by a qualified inspector, and that bill, of course, will be enforced. It might seem on first thought to be impracticable, but I do not think we will have any difficulty in enforcing it. In places the size of Toronto it is much easier to enforce these things than it is to wait until the town grows to a million, or in such a large city as New York is at the present time. If an effective system of regulation relative to pure meat is put in force in a town, my idea about it is that it will naturally in time culminate in the extermination of the old type of slaughterhouse as it existed, and that undoubtedly is going to be to the advantage of every one.

Dr. Behnke: Mr. Chairman, I just wanted to add a few words regarding what was said concerning the necessity of agitation in order to adopt proper municipal meat inspection. My experience in the Bureau has given me an opportunity to note the conditions under which the inspection is carried on in various municipalities throughout the country, and I wish to say that the practising veterinarian has a great opportunity in the cities by getting in touch with the local board of health and giving the board the benefit of his experience. It will not only benefit the board but it will help to produce a good spirit on the part of the board of health toward the veterinarian, and it will help to obtain a good meat supply by good inspection. There is no question but that they can get their local health officers interested. In a thorough campaign of education they can get the people interested and in time an adequate fund will be provided to obtain a proper municipal inspection. I think we all agree that with municipal work there should be a municipal abattoir, and the slaughter should be confined to that place. It has already been demonstrated that this can be conducted without financial loss. It has also been conducted without detriment to the local slaughterhouse.

Now, there is one other subject I want to refer to this morning. I wish to refer particularly to the country practitioner. The federal meat inspectors meet practitioners both from the city and from the country, they are called upon to show the methods of inspection and they are also asked to give any information that may be desired. There have been in different abattoirs at different times a large number of animals received which have reacted to tuberculosis, and animals which have been infected with other diseases, and the veterinarians who made the test or who inspected the cattle, have not been interested enough to follow the shipments to the abattoir where the animals were killed. The A. V. M. A. is interested in the prevention and eradication of contagious diseases. Where there is federal inspection, the official veterinarian would rather explain the lesions found to the country practitioner than to the owner of the animals who frequently goes to the city and goes over the carcasses when they are slaughtered. My own experience has been that whenever an owner has gone to the city, however, he has gone away satisfied and convinced not only of the condition of his animals at home, but also as to the prime necessity of supporting and enforcing the work of the federal inspector.

THE CHAIRMAN: Is there anyone else who wants to speak on this subject? If not, we will proceed with the next paper, which is entitled, "Dairy Problems and the Municipal Food Inspector." Dr. Tracy, I believe, is not here. We will consider the paper as read by title.

THE PROBLEM OF DAIRY SANITATION

By A. W. Tracy
Sherbrooke, Canada

The production of milk from healthy cows and the delivery of the same to the consumer in a condition as nearly approaching the state of purity in which it comes from the cow as is possible, is one of the principal problems that today confronts the sanitary inspector.

This problem is a complex one, or rather a composite one, inasmuch as if one would solve this he must first deal with several lesser ones. The lesser ones may be enumerated as follows:

The health of the milch cow.

Equipment: Stables, water, feed, utensils, etc.

Methods: Owner and attendants.

I propose in this paper to take up only the work undertaken in this city of 18,000 population and what we have accomplished in the course of two years or less, for the two years will not have expired until November 1.

Up to November 1, 1911, nothing had been done to improve the conditions surrounding the milk supply of this city. Owing to the prevalence of tuberculosis among the people and the fact that it was increasing rapidly, the board of health laid down the following program with regard to the milk supply, with a view of possibly lessening the ravages of the disease. This program embraced the following regulations:

1. That all cattle from which milk was being sold in the city must be subjected to the tuberculin test and the reactors removed.

2. That all stables and buildings in which milch-cows are kept, to have installed adequate ventilation and windows equal in area to one-tenth of the floor space; stables, etc., to be lime-washed whenever the inspector considered it necessary, at least twice yearly.

3. To encourage the establishment of separate buildings for the storing and handling of milk and washing and sterilizing of milk utensils.

4. Any other sanitary measures which the inspector might consider necessary for the purpose of obtaining pure milk.

These were the principal paragraphs which had any bearing on the work of the veterinarian in charge of the inspection work.

The tuberculin test of the cattle was undertaken first, with the result that in some thirty dairies, comprising 650 head, 13 per cent. were found to be affected. These were removed and all cattle brought in to replace them were also tested.

A second test of these cattle, eight months later, gave us $1\frac{1}{2}$ per cent. of reactors. A third test eighteen months after the first, gave us four reactors out of 674 head, a little over $\frac{1}{2}$ per cent.

I may say in this connection that the test met with some opposition on the part of the farmers and dairymen. In the first place there was no compensation for the loss of these reactors.

Secondly, a demand was at once created for good milch cows that had been tested. This demand, in the first instance, could not be met by cattle-dealers; but by the time our second test was completed upward of twenty-five farmers who are engaged in the rearing of milch-stock had had their herds tested and were in a position to put a number of tuberculin-tested milch cows within reach of our city dairies. I may say in this connection that at present there are 79 of these tested herds, aggregating over 1100 head, for our dairies to draw upon for fresh cattle, and the number is daily increasing. It is my opinion that in three years, three-fifths of the farms in this district will be free from tuberculous cattle, and this without compensation or any cost to the government whatever.

The tuberculin used in our work here was supplied by Parke, Davis & Co., and was listed as Bio. No. 920. Both the intradermal and subcutaneous tests were employed, and, as my experience goes, I am of the opinion that the intradermal is fully as reliable as the subcutaneous and much easier to administer.

The reactors in the majority of cases have been killed under veterinary inspection, some were slaughtered by the owners and the carcasses buried or burned. In no case has it come to my notice that a reactor, at the time of slaughter, failed to exhibit post-mortem lesions of tuberculosis. On the other hand, one old cow that failed to react was found to be diseased when killed.

With regard to ventilation, we have advocated Dr. Rutherford's system and it gives us good satisfaction. However, many dairymen contend that in order to obtain a good supply of milk it is necessary to keep the stable at a temperature of from 65° to

70° F., as the stables are not heated artificially. This temperature can only be obtained by closing up the ventilators (I am speaking now of the Canadian stable during the winter months), and until the milkman can be educated up to the point that pure fresh air is more important than a high temperature, it does not matter much what kind of a ventilating system has been installed, because they are put temporarily out of commission just when it is most important that they should be working.

One-tenth of the area of the floor is the requirement for windows, 500 cubic feet space for each animal in the stable. Manure to be removed twice daily to a distance of not less than 200 feet from the stable.

The above regulations have been met by much stubborn opposition, but we have over half of our milkmen living up to them and as time goes on the rest are continually improving. The score-card of the Bureau of Animal Industry has been adopted and we find it a great help, both as a record of each individual and an object lesson generally.

In nineteen dairies we have succeeded in getting nineteen milk-houses built, thus lessening the contamination of the milk from kitchen sinks, etc., where it is customary to wash milk utensils.

We have a milk depot installed near the center of the city in which a 500 gallon pasteurizer is operated. Here milk can be obtained at all times and in any quantity; poor people who have no cold storage in their homes can always obtain supplies of this pasteurized milk at any time, and it is a notable fact that infantile mortality has lessened 20 per cent. among the poor people during the past six months compared with a corresponding period of 1912. While we feel that we have accomplished a great deal along the lines of milk sanitation, still we realize that we have a tremendous amount of work to do before we arrive at the high standard attained by many cities of a like population. We have no laboratory and our facilities for making biological tests are very unwieldy and unsatisfactory, having to depend on the good-will of the staffs of the hospitals. The appropriations made by the city for this work are very inadequate.

I submit this paper for your consideration, gentlemen, realizing that I am not giving any new matter for thought, but simply a report of my work for the past two years.

The next paper is "The Sanitary Barn and its Relation to Clean Milk," by Dr. Cassius Way, of Harvard, Ill

THE SANITARY BARN AND ITS RELATION TO CLEAN MILK

By Cassius Way
Harvard, Ill.

In having been requested to present a paper at the A.V.M.A. at this time I feel highly honored, first, on account of having an opportuntiy to bring before this convention a few practical everyday points relative to dairy sanitation, and second, that I should have the privilege of presenting this paper before so many sanitarians and eminent scientists meeting under such pleasant auspices and celebrating the fiftieth anniversary of this great Association.

Clean and safe milk, healthy cattle and sanitary stables are being demanded from the milk producer and the dairy farmer by the great milk-consuming public. These demands are being carried out and actuated by boards of health, state and government authorities, large creameries and milk distributing companies in the endeavor to secure a safer, cleaner, better supply. It is impossible to secure a safe milk supply without having a healthy herd, and a sanitary stable is of great assistance and a valuable adjunct in maintaining a healthy herd and in producing clean milk. Safe, clean milk is directly dependent upon the health of the herd and the methods employed in its production.

Large milk distributing companies are paying for milk on the score and butter fat basis and this, together with the education of the dairyman along these lines, will do much to advance the standard of dairy sanitation and improve the quality of commercial milk. A high price does not necessarily mean clean milk, but clean milk means an extra cost in production. The dairyman of today, who is in business for profit and better results, will respond more cheerfully, quickly and willingly when paid in cash for his increased efforts than to any other less tangible form of remuneration.

During the past few years the proper housing of dairy cows has received more careful consideration than ever before. Investigations have been made by men who are thoroughly conversant with the subject from a practical as well as a scientific standpoint. Thorough, conscientious and capable scientific men have planned out various campaigns of dairy inspection in order to obtain a cleaner milk supply, each in accordance with certain definite local conditions. The result has been that all over this country there has been started a campaign of education for a cleaner, safer, better milk supply. In every instance the work has started at the dairy and proceeded along the various lines of production, transportation and distribution until the product has reached the consumer's door. Today the milk supply of the majority of large cities is well supervised. To my mind there are many points of interest in this particular line of sanitary work and my only excuse for presenting this elementary paper is to point out some of the important fundamentals of sanitary construction and present some of the phases in which the veterinarian may play such an important part and render some very valuable assistance to the dairyman and his clients.

In our northern climate warmer stables have for years occupied the attention of our best farmers and stockmen. Bank barns were the outgrowth of the desire to provide comfortable stables that were both warmer and supposedly better. The convenience of having all stock under one roof tucked carefully away from the cold was very alluring to ambitious farmers. But animals housed in these expensive dungeons were not happy and showed their discomfort in watery eyes, lusterless hair, hot noses and hot, feverish breath, with fitful, quarrelsome actions, together with their inability to grow or fatten. Frequently animals thus housed were subject to various bovine diseases which were materially assisted in their work of destruction by conditions so expensively though unintentionally provided. However, experience has told the observing dairyman that under such conditions his animals are not at their best and the gradual evolution of the sanitary barn took place until now it is the exception rather than the rule, in the large dairy districts, for a dairyman to build other than up-to-date sanitary stables.

The proper location of a dairy stable is the first important consideration. Good air, good drainage, plenty of sunlight and an abundant water supply are essential features. The stable should be situated among surroundings that afford a good natural drainage and should be equipped with a good cement floor, tight walls and ceiling, ample light (four square feet per cow), plenty of air space (500 cubic feet per animal), and finally, and most essential of all, it should be equipped with an efficient ventilating system. I have studied this matter from a great many view-points and have made many observations concerning the proper ventilation of dairy barns, and I am of the opinion that if a sanitary stable can have but one sanitary equipment that one should be ventilation; all others are secondary. Essential as pure, wholesome food is to both man and animals just as essential, and I dare say more so, is pure, wholesome air. This great natural agent stands first in the treatment of tuberculosis, and it is equally as important in the prevention of disease and in assisting the body in the various physiological processes of metabolism, assimilation and nutrition.

In ventilating a cow stable we should provide for fresh air to enter the stable in front of the cows and disseminate without creating drafts throughout the stable, passing out through an outlet of ample size behind the cows, thus giving the animals the best air in the stable to breathe, and taking out the odors and steam from the feces and urine without carrying it by their heads. One large outlet shaft of sufficient size to ventilate a stable, being constructed on the ratio of five or six cows to the square foot, is far more practical, much cheaper and easier to build and from results obtained is infinitely better than enough small chutes a foot or a foot and a half square to make up the required amount of ventilation area. There should be intakes enough, not exceeding individually one-half a square foot in area, to nearly equal the area of the out-take chute. For example: A stable to accommodate fifty-four cows would require an outlet shaft 3 feet square, containing 9 square feet of ventilation area and 16 to 18 one-half square foot intakes distributed evenly around the outer walls would be required to secure enough fresh air in the stable; these can be regulated to suit the atmospheric conditions, but we must have almost as much inlet area as we have outlet.

The top or cap on the outlet chute should be at least 18 inches above the chute. This is to allow for ample capacity of the large outlet shaft. Many make the mistake in putting the cap on the ventilator or putting it 6 or 8 inches above the body of the chute, thus cutting down the capacity, and when the warm air laden with moisture gets into the chute it cannot get out fast enough and therefore condenses on the upper portion of the shaft. The large chute is not necessary if the capacity is to be reduced at the top or outlet, the result of which is inefficient and inadequate ventilation. The stable should be tight and the hay chutes closed except when in use. Under these conditions this ventilation will work admirably and save the dairyman many dollars in protecting the roof and timbers from frosting and rotting out.

We cannot too strongly urge the importance of liberal sunlight in stables not only for its warmth but for its cheer and assistance in carrying on the daily work during the winter months. When new buildings are to be erected, I would suggest, where possible, that the barn run east and west, thus providing for a south exposure, which is so very desirable during the winter months. No dairyman can afford to house his cows in an underground, dark, damp or forbidding stable if he is in the business for profit and satisfactory resuts. The cow, above all other domesticated animals, responds quickly to the kind of treatment she receives. The limit of her profit is measured by the care and surroundings given her.

A properly constructed floor is of great importance in a sanitary barn. It should be constructed of non-absorbent material, preferably cement, and the cow bed may be covered with cork brick if desired. The manger should be from 30 to 36 inches wide and 10 to 12 inches deep. The platform should be just wide enough to accommodate the animals (a platform 4 feet 6 inches wide will accommodate Jerseys, 4 feet 7 or 8 inches for Guernseys, Ayrshires and average-sized animals, with 4 feet 8 inches to 5 feet 2 inches for Holsteins, depending entirely upon their size). The gutter should be 8 to 10 inches deep and 18 to 20 inches wide and 3 or 4 inches deep on the driveway or walk side. This will keep the cows clean, which is the first essential in clean milk production.

A cement floor where animals walk should never be troweled with steel or creased in any way, but should be finished with a wooden float, as the masons say, or brushed lightly with a broom. A floor that is finished with a steel trowel is smooth and very slippery and creases fill up with manure and stable filth and becomes almost as slippery as the very smooth floor.

A sanitary stable to be clean and up-to-date these days must be whitewashed at least two or three times a year, oftener if necessary. The contrast between the old-time stable, where the spider has hung his drapery of cobwebs from every projection and in every nook and corner, and the modern, clean, whitewashed, convenient stable is very marked. Whitewash is an abomination to the spider and is of inestimable value in dairy sanitation.

A clean, dry yard plays an important part in controlling the cleanliness of animals. Where cows are obliged to wade through mud and manure up to the hocks and belly they are not only smeared and plastered with filth, which usually in the hands of dairymen who allow such conditions is never washed off, but they are subject to many hoof and skin diseases directly dependent on such conditions. Nowadays good dairymen overcome these conditions, first, by not allowing any manure or stable filth to accumulate in the cowyard, and also by providing either a gravel, cinder or cement paving for the yard.

Milk is a suitable medium for conveying many forms of infectious diseases of animals and man. The pathology of milk, therefore, would naturally involve a study into those conditions which are regarded as primary to the propagation or dissemination of disease, both on the ground that milk is a fertile culture-medium as well as a convenient vehicle. The maintenance of a healthy herd is the most potent factor in a sanitary milk supply. The herd should be under the surveillance of a skilled veterinarian and any animals suffering from diseased udders or general constitutional diseases of any kind, especially those involving the genito-urinary tract and the lymphatics, that will in any way harm the milk, should be separated from the milking herd and treated, killed or disposed of as the case demands. The veterinarian, by virtue of his training and varied experience in sanitation, is the proper individual to watch over the health of the herd.

To maintain a healthy herd, requires careful supervision and regulation. A careful, thorough physical examination of all animals should be made as often as possible.

There have been no hard and fast rules laid down to govern a thorough physical examination. All external appearances of disease should be carefully taken into consideration; the udder and all superficial lymph glands should be critically examined; a careful rectal examination should be made; the lungs should be thoroughly auscultated, and the general appearance of the coat, the eyes, the ears, and the countenance are essential points in this very important work.

The attendants should be free from disease of all kinds for, owing to its susceptibility to contamination, and being an ideal culture media, milk is often rendered a disease-carrying medium, while the venders of such milk are innocent of any contamination with human disease producing organisms. To this end, a thorough and systematic medical inspection of dairymen, their families and employees should be maintained by all milk distributors in order that they may protect their customers and themselves as much as possible.

Milk should be drawn from the cows at regular intervals into clean pails, preferably of the narrow-top design. From a bacteriological standpoint this is the most important stage in the production of clean milk. Excessive numbers of bacteria indicate the presence of foreign matter, filth and dirt. Milk that is drawn into an open pail from cows whose udders, flanks and hips are loaded with manure and stable filth, must from the very nature of the process of milking be heavily laden with organisms of an undesirable nature. Therefore, clean cows and narrow top milk pails are prerequisites to clean milk. Many experiments have been conducted to ascertain the value of covered pails in reducing the bacterial count, with the uniform result that this form of pail reduces the numbers of bacteria fully forty to seventy per cent. Progressive dairymen are anxious to reduce the undesirable bacterial content of their milk and the narrow top pail is fast coming into use among practical dairymen.

Next in importance to clean milking is proper cooling; this should be done immediately after the milk is drawn from the cow, inside a clean milk house, situated within clean surroundings.

Clean, sanitary milk, therefore, can be obtained if the cows are clean and kept in clean surroundings and persons caring for them and doing the milking are cleanly in their habits and personal appearance. This requires careful daily routine. The stables should be well lighted and ventilated; whitewashed at least twice a year; have tight, sound floors with gutters of non-absorbent material. The fact that milk is such a delicate article of food, so susceptible to change and an ideal culture media should control all methods of production.

The importance of safeguarding milk from the cow to the consumer is self-evident. It is to maintain the natural flavor of the milk. It is to deliver to the consumer a food that contains nothing except that which it has a right to possess by nature, a definite per cent. of butter fat, a uniform quantity of other solids, a certain fixed percentage of water and a few bacteria. Milk is a balanced ration, containing enough food to sustain life for an indefinite period. The consumer should be educated in the value and care of this sensitive food, and then he should be willing to pay for the extra demands he makes on the producer.

Unfortunately the general public has for a long time known only one milk and that governed mainly by the price. Indifference on the part of the consumer in regard to quality and sanitary conditions in dairying has done much to retard progress such as has been seen in other lines of food production.

As the careful thorough veterinarian is the chief adviser in regard to matters pertaining to the health of the herd, it seems that he should be the first person whose advice is sought in connection with the building of a sanitary stable. For too many years the old-fashioned carpenters, contractors and masons with antiquated and out-of-date ideas have supervised the planning and building of supposedly up-to-date stables. City architects thoroughly capable to plan and construct elaborate dwellings and apartment houses, skyscraper office buildings and huge department stores have occasionally planned stables, in the majority of cases for rich clients, that should have been models; however, they often fall far short in the fundamental principles of sanitary construction. Here is a field in which we, as veterinarians, can do much good both financially to our clients and to the great animal industry of this country. We can be of great assistance and render valuable advice in this fundamental work leading up to healthier, better living conditions for healthier better producing herds.

THE CHAIRMAN: We will take up the two papers at present uncompleted from the program of yesterday. The first is, "The use of Tuberculin in Testing Cattle and Hogs by Intradermal and other Methods," by Dr. Haring, of Berkeley, Cal. This paper was referred to the section from the Committee on Diseases. We will have the paper first and the discussion afterward.

RESULTS OBTAINED WITH TUBERCULIN IN TESTING CATTLE AND HOGS BY THE INTRADERMAL AND OTHER METHODS[1]

By Clarence M. Haring and Ralph M. Bell
Berkeley, Cal.

The intradermal or intracutaneous[2] method of applying the tuberculin test to cattle is now regularly used by several veterinary practitioners in this state and reports from other states and from foreign countries indicate that the method is rapidly gaining favor among veterinarians elsewhere. The test possesses such advantages in economy of time and materials that it has been widely accepted by practitioners as a substitute for the subcutaneous method, without waiting to determine whether it is sufficiently accurate to warrant such an acceptance. The data concerning its accuracy, as compared with that of the usual subcutaneous method, are not sufficient, however, to convince many state officials of the advisability of accepting the intradermal test as a substitute for the subcutaneous. In regard to the acceptance of this method for the admission of cattle into states requiring a tuberculin-test certificate, the following information is of interest: Statements have been received by the writers from the live-stock sanitary authorities of thirty-nine states. In two of these the intradermal test is accepted, if performed by an approved veterinarian. The state veterinarian of another state wrote us that he would not recommend that the live-stock sanitary board recognize the method indiscriminately, but under certain conditions, when the test is made by an unusually well-qualified veterinarian, and a certificate for physical examination accompanies a report of the test, he would recommend that the board accept it. Another veterinarian writes: "We are using the intradermal test exclusively in our state work, but for interstate shipments we are using the thermal method, for the reason that the intradermal leaves no record. Therefore until such time as an agreement can be made between the different states and there is a better system for the control of the veterinarians, it will be necessary for us to require the thermal test and a record of the same filed in this office immediately after the inspection is made. We have the greatest confidence in the intradermal test and would not hesitate to accept shipments where it has been applied, except for the fact that only a very small per cent. of the veterinarians doing interstate work are familiar with the intradermal test. Therefore I see no possibility of our accepting the intradermal test in the near future.

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[1] Contributed to the Report of the Committee on Diseases.

[2] The terms intradermal and intracutaneous are synonyms. Custom renders the word intradermal preferable, when mentioned in connection with the testing of cattle.

Most of the state authorities agree that they cannot as yet officially accept the intradermal method. The consensus of opinion seems to be that the test is fairly satisfactory when administered by a careful and experienced operator, but that it is unsafe to accept such tests from veterinarians indiscriminately, until the method has come into more general use and has been accepted by the United States Bureau of Animal Industry.

In human practice the intradermal method is used to some extent.[1]

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[1] The tissues of tuberculous persons and animals are sensitive to tuberculin. This sensitiveness is most marked in the tissues that are actually invaded by the germs, but it also exists to some extent in the other tissues of the body which contain bloodvessels. The living tissues of individuals who have not been infected with tuberculosis show no sensitiveness to tuberculin.

Attention was first called to the possibilities of the intradermal injection of tuberculin as a means of diagnosis by Mendel, who suggested that the procedure followed in the intradermal method of injecting for anesthesia would be a delicate and satisfactory means of diagnosis. The suggestion was soon put into practice by Mantoux and others. According to Hammam and Wolman,[10] the intradermal method when applied to man has no equal as a means of estimating the degree of tuberculin hypersensitiveness. They conclude from a study of the records of a large number of tests made by the various methods of tuberculin testing that the intradermal and subcutaneous local tests are the most delicate tests for man. They reveal practically the full percentage of tuberculosis infected individuals. In the order of their sensitiveness the tests for tuberculosis in man arrange themselves, according to Hammam and Wolman,[10] as follows; Intracutaneous test (intradermal); subcutaneous local test (stichreaction); cutaneous test (von Pirquet); subcutaneous test (Koch); percutaneous test (Moro inunction); conjunctival test (Calmette ophthalmic). As a means of diagnosis of tuberculosis in man the first two tests are said by these writers to be undesirable for the very reason that they detect even the latent cases of infection. They state that in adult life, and even in late childhood, the subcutaneous local reaction is of absolutely no diagnostic value, since only an occasional individual will escape its searching scrutiny. What little diagnostic value it has is restricted to the first two years of life, and even at that age it has no marked value above the cutaneous test for the reason that these tests have shown the astonishing extent to which man is tuberculosis-infected and at what an early age the infection occurs.

Many physicians consider this method too delicate for routine diagnosis in man. Their objection is that the test is so searching in its scrutiny that it causes reactions in latent cases which would probably never develop active tuberculosis.

In veterinary practice, however, this "searching scrutiny" is usually desired and from data already available there is reason to believe that this test *when combined with observations concerning the thermal reaction furnishes a more accurate means of diagnosis than the usual subcutaneous method* of testing cattle, in which no attention is paid to the local reaction and no attempt is made to select and prepare the field of injection and to inject in such a way that if the local reaction occurs it will be easily detected.

TECHNIC OF THE INTRADERMAL METHOD. The manner in which this test differs from the usual subcutaneous test is that the tuberculin is injected into the deeper layers of the skin. The most suitable place to make this injection is in one of the folds of the skin on the under side of the base of the tail. We have used the skin of the neck in some of our tests, but find the subcaudal fold more convenient. The skin here is free from hair and is soft and pliable. A hypodermic syringe with a short needle-point should be used. A suitable hypodermic syringe is a 25 or 26 gauge needle, with a point three-sixteenth to a quarter of an inch in length, such as dentists use for injecting local anesthetics. (See Fig. 1.)

The subcaudal fold is grasped between the thumb and first two fingers of the left hand and the needle inserted horizontally into the thickness of the skin grasped between the thumb and fingers, Fig. 3. The $\frac{1}{10}$ or $\frac{1}{5}$ c.c. dose, if properly placed, can be felt in the layers of the skin as it is expelled from the syringe, where it remains as a small lump in the skin after the needle has been removed. In our first tests we made the mistake of trying to inject as near the surface of the skin as possible. It is difficult to inject into the layers of the epidermis and an injection into this part of the skin is of little diagnostic value. In case the needle is of the proper length, namely, one-quarter of an inch, there is little danger of going completely through the skin. When the proper point in the subcaudal fold is selected, it makes little difference whether the point of the needle is in the derma or in the subdermal connective tissue. With the proper syringe an expert operator can inject in the dark as accurately as in a good light. We have found that characteristic reactions occur with the injections from a long needle, placed completely through and beneath the skin layers of the subcaudal fold. On this account it is well to inject at a point on the fold about two and a half or three inches down the tail from the anus. (See Figs. 9 and 10.)

After successfully using the intradermal method on 1500 head of cattle Longley has expressed the opinion that it is impossible to inject into the skin proper, but that the dose goes into the subdermal connective tissue. From experiments which we have made on the hides of recently killed cattle, we think he must have meant the epidermis. When a one-quarter inch needle is inserted slightly horizontally into the subcaudal fold it rarely penetrates deeper than the lower layers of the derma or true skin.

In injecting cattle that are secured in stanchions, a convenient way is to stand by the side of the cows (as shown in Fig. 3), pressing the knee into the animal's flank, and grasping the loose fold of skin from under the tail, without raising the tail. Some operators, when injecting, prefer to stand directly behind the cow, as shown in Fig. 4, but this method is impracticable except with very docile cattle or when an assistant is available to steady the animal and keep her from moving from side to side.

We deem it impracticable to disinfect or otherwise prepare the subcaudal fold for the intradermal injection, except when it is soiled. In such cases, wipe the fold clean with a rag, apply 50 per cent. alcohol with absorbent cotton and wipe with dry cotton. Before injecting each animal, the syringe needle should be dipped in strong disinfectant and wiped dry with sterile absorbent cotton. After dipping the needle in an irritating disinfectant, take pains to wipe it off before inserting it for fear the disinfectant may cause irritation and produce a swelling which might be mistaken for a reaction.

The application of strong disinfectants at the point of intradermal injection should be avoided. In several instances we have observed swellings, varying in size from a hazelnut to a hen's egg, on the subcaudal fold as a result of the application of strong lysol solution. These might have been mistaken for reactions but for the fact that the cattle were not injected with tuberculin. (See Fig. 14.)

Kind and Strength of Tuberculin for Intradermal Use. From experiments which we have conducted during the past year we believe that a strong solution of *alcoholic precipitated tuberculin*[1] is more suitable for use with the intradermal test in cattle than Koch's old tuberculin. In order to obtain a distinct and well-marked subcaudal reaction this purified tuberculin should be used in at least a 2 per cent. solution (20 milligrams per c.c. of physiological salt solution), administering doses of between $\frac{1}{10}$ and $\frac{1}{5}$ c.c. Vallee[39] and his co-workers endeavored to obtain the subcaudal reaction with the minimum dose, but in order to obtain the maximum number of reactions in tuberculous cattle we believe it is desirable to use a stronger solution than they suggest. This point is discussed later in connection with tuberculin manufactured by various firms. Ten per cent. solutions of precipitated tuberculin (100 milligrams per c.c. of physiological salt solution) will produce violent local and thermal reactions in tuberculous cattle, when administered intradermally.

In the United States there is a great lack of uniformity regarding the tuberculin used. We have purchased "intradermal" tuberculin from six different firms, and in only two instances has the product been the same, as is shown by the following:

Firm A Recommends for the intradermal test in cattle, a tuberculin bearing the label: "Tuberculin O. T. (original) serial dilution No. 5. 1 c.c. contains 100 mg." This they state is prepared by diluting one part of Koch's old tuberculin with nine parts of physiological salt solution containing $\frac{1}{4}$ per cent. trikresol. Recently this firm has placed on the market "Intradermal Tuberculin, Veterinary," which is essentially the same as the above in strength, although in its preparation it is not deemed necessary to concentrate the original culture down to the full equivalent of Koch's old tuberculin before diluting it back to the strength of dilution No. 5. On request they will also furnish for the intradermal test dilutions of alcohol precipitated tuberculin, glycerin-free, in any dilution desired up to 10 per cent. solution.

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[1] Laboratories vary considerably in their method of preparing precipitated tuberculin. Most of the tuberculin, which we have used has been prepared as follows:

To nine volumes of absolute alcohol add one volume of Koch's old tuberculin concentrated. Stir thoroughly and set aside for twenty-four hours. At the end of this time a flocculent deposit will be seen in the bottom of the vessel. The supernatant fluid is decanted and the partially dried precipitate redissolved in one volume of 1 per cent. sodium chloride solution and the tuberculin reprecipitated by adding this solution to nine volumes of absolute alcohol. The supernatant fluid is decanted and the precipitate washed by adding it to nine volumes of absolute alcohol. The precipitate is then placed on Petri dishes or clay plates, put in a desiccator and under vacuum dried over sulphuric acid.

A brownish powder can be scraped from the plate. This is the *precipitated tuberculin.* This tuberculin is soluble in the proportion of one part by weight to ten of water, but higher concentrations can sometimes be obtained. According to Drieger and Proskauer,[6] $\frac{1}{10}$ of a gram of this precipitated tuberculin produces the same effect as $\frac{5}{10}$ grams of crude tuberculin (Koch's old). According to Hammam and Wolman[10] this kind of tuberculin seems to be more toxic to animals than Koch's old tuberculin.

Firm B Recommends for the intradermal test of cattle, a tuberculin bearing the label, "Solution Purified Tuberculin for Intradermal Test. Each c.c. contains 5 milligrams purified and precipitated tuberculin in sterilized normal salt solution. Dose: 1 to 5 minims." They state that this is the strength of tuberculin recommended by Vallee, and is the minimum dose and strength which will produce good intradermal reactions. On request, this firm will also furnish for the intradermal test stronger solutions of alcohol precipitated tuberculin.

Firm C Recommends for the intradermal test in cattle, "Ordinary Veterinary Tuberculin." This is presumably similar to that distributed by the Bureau of Animal Industry for the use of state and municipal officials.

Firm D State that they do not dispense an especially prepared tuberculin for the intradermal test, but recommend their "concentrated tuberculin." The label on this tuberculin reads as follows, "Tuberculin, Veterinary, ready for use." This firm advises us by letter that this concentrated tuberculin is seven times the strength of the ordinary culture and contains 35 per cent. glycerin.

Firm E Recommends a 50 per cent. solution of Koch's old tuberculin. This corresponds with the recommendations of Hutyra and Marek, Joseph and others. This firm writes that they also dispense a purified tuberculin of strength equivalent to the above for intradermal use. They are not able to state the method of the preparation of this tuberculin, as it is manufactured in a foreign laboratory.

Firm F Recommends their tuberculin especially prepared for the intradermal testing of cattle. This firm could not give any particulars regarding the content of the tuberculin or its method of preparation, as it was manufactured in a foreign laboratory.

In view of the diversity of tuberculins recommended for the intradermal test, the following information concerning the relative merits of alcohol-precipitated tuberculin versus Koch's old tuberculin is of interest.

Alcoholic-precipitated Tuberculin. Our reasons for preferring this to dilutions of Koch's old tuberculin are as follows:

In thirty-two of our intradermal tests with Koch's old tuberculin, the results were checked by injecting the opposite subcaudal fold with $\frac{1}{5}$ c.c. of physiological salt solution, containing 5 per cent. glycerin and $\frac{1}{2}$ per cent. phenol, a new clean syringe being used. The swellings produced by the glycerin in two cases were persistent enough to be confusing. We then undertook extensive

FIG. 1

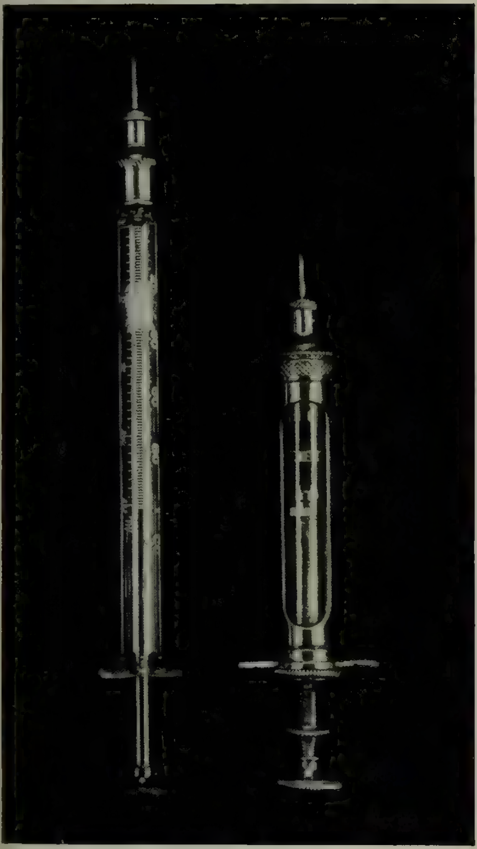


FIG. 2

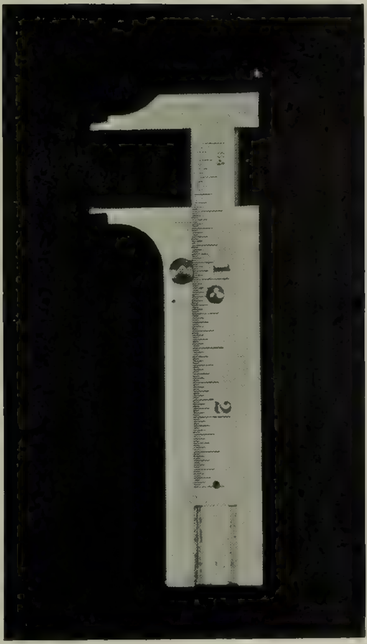


FIG. 1.—Either of the two syringes shown above is suitable for intradermal injecting. The shorter one is a dental syringe of 30 minims capacity, with a burr on the piston which can be used to regulate the dose. For intradermal work the needle point should be about one-quarter of an inch long.

FIG. 2.—Calipers similar to those shown above are useful in determining the exact size of the reaction swelling.

Fig. 3

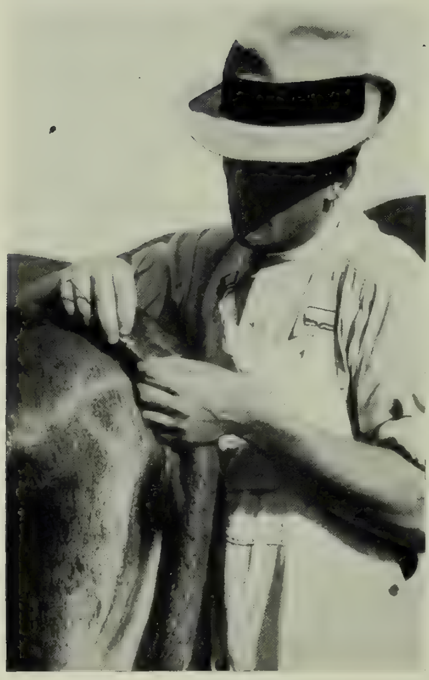
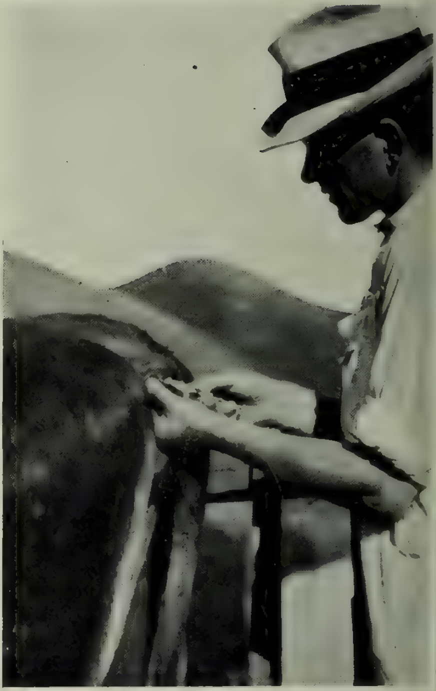


Fig. 4



In making an intradermal injection, one of the folds of skin beneath the base of the tail is grasped between the thumb and fingers and the needle inserted, horizontally, into the thickness of the skin between the thumb and fingers. If the needle is properly placed the tuberculin can be felt in the deeper layers of the skin as it is injected, and after the removal of the needle the tuberculin can be felt as a lump about the size of a small pea. The best reactions are obtained when the tuberculin is injected into the deeper layers of the skin. Inject deep enough so that the fluid does not swell out the skin like a blister. We consider Fig. 3 a more convenient position for operating than Fig. 4.

Fig. 5

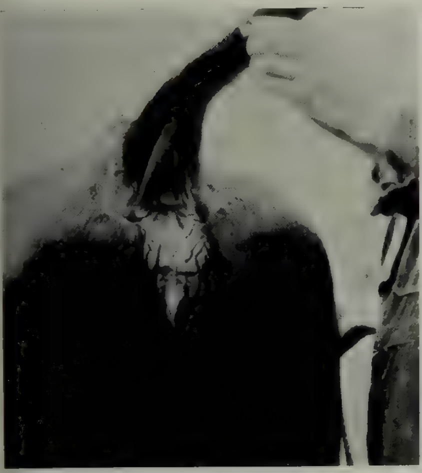


Fig. 6

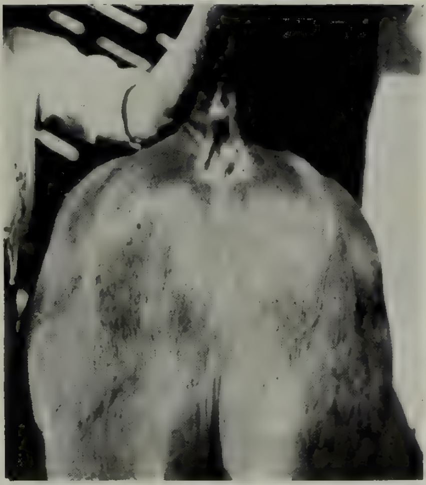
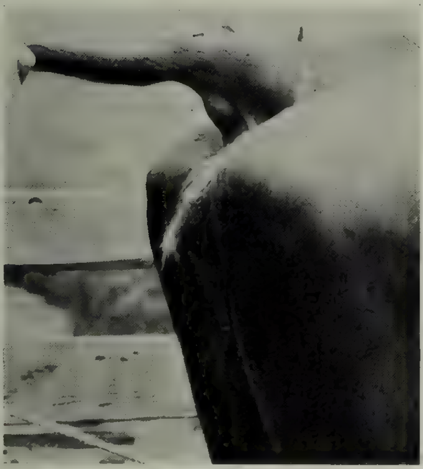


Fig. 7



The figures in this plate show typical intradermal reactions. A reaction to the intradermal test is indicated by a swelling or a thickening of the skin at the point of injection. The swelling may be either soft and pendulous, as Fig. 5, or hard and inflamed, as in Fig. 6.

A recognizable reaction may be present at the sixth hour, but generally the reaction swelling is first clear about the twelfth hour and continues to increase in size until the forty-eighth hour. In some instances we have observed that the early local reactions disappear by the forty-eighth hour, while in other cows delayed reactions have been noted that did not appear until the ninetieth hour. In order to be certain of every case observations should be taken about the thirtieth, seventieth and ninetieth hours after injection.

Fig. 8

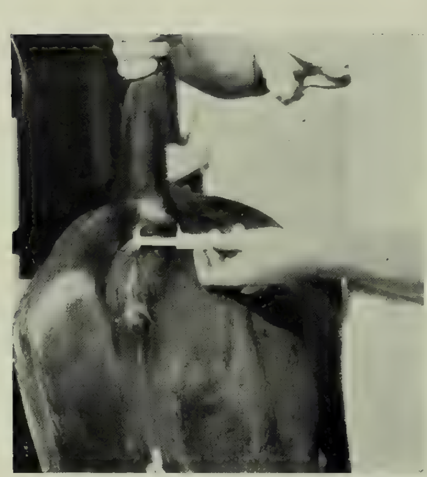


Fig. 9

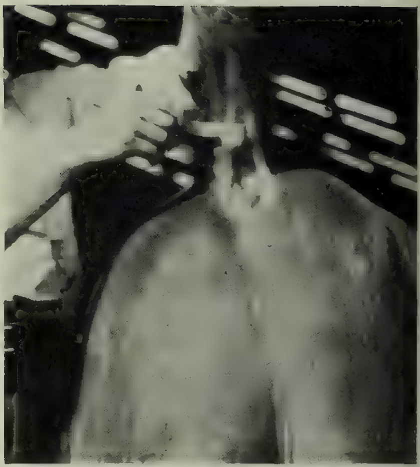
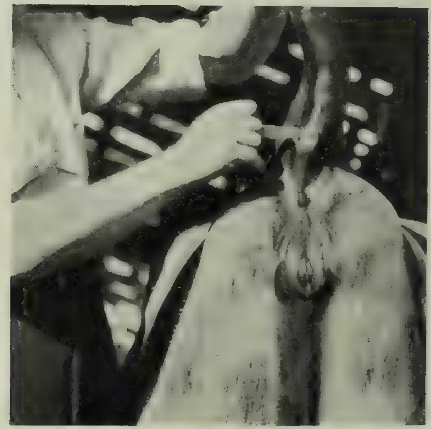


Fig. 10



The use of calipers to determine the exact size of the swellings is shown in Figs. 8, 9, and 10. However, in judging a local swelling, to determine if it is a positive reaction to tuberculin, one should depend on the shape, appearance, tenseness, sensitiveness and location with respect to the exact point of injection more than upon the actual measurements. Only experience can teach one how to be certain of a positive reaction when the local swelling is small. This is especially true when tuberculin containing glycerin is used.

FIG. 11

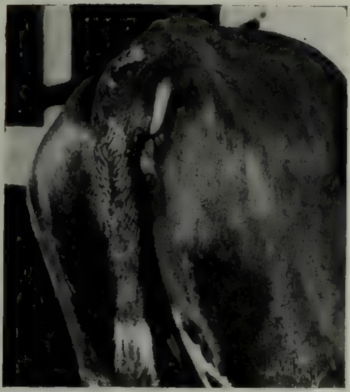
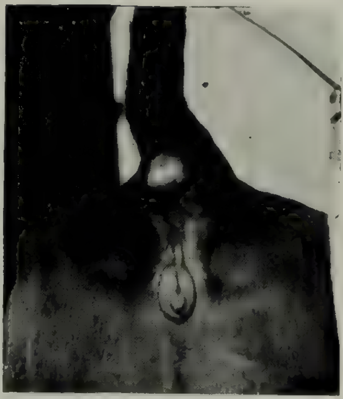


FIG. 12



As shown in Fig. 11, the intradermal reaction is sometimes so large that it can be seen without raising the tail.

Fig. 12 shows an intradermal reaction that obliterates both subcaudal folds.

FIG. 13

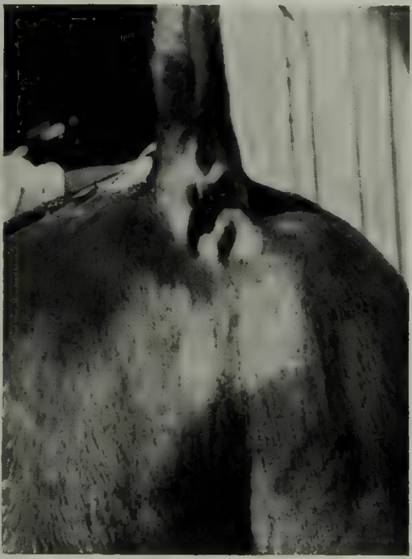


Fig. 13 shows the swellings due to two injections with a six-day interval. The left subcaudal fold was injected July 30th and a local reaction the size of an orange occurred, which persisted several weeks. The right fold was injected August 5th and resulted in a local reaction the size of a walnut. (See Animal 6, Table III.) Thermal reactions usually accompany intradermal reactions. One advantage of the intradermal reaction is that it often leaves a more or less permanent mark which can be used to identify the reacting animals for several weeks.

Fig. 14

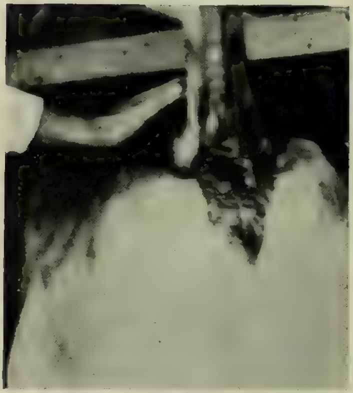


Fig. 14 is not a reaction, but shows a swelling caused by the application of a strong solution of lysol. Irritating disinfectants should not be used before applying the intradermal test.

Fig. 15

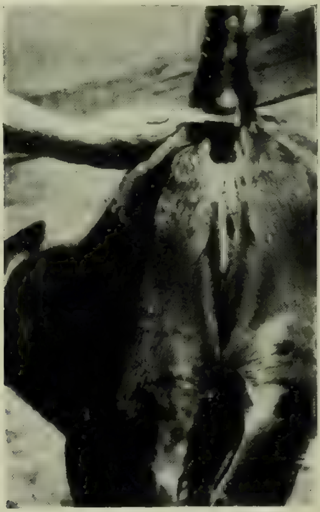


Fig. 15 shows an intradermal reaction in a calf six weeks of age. The test is especially adapted to the testing of young calves and wild range cattle.

trials concerning the effect of solutions of glycerin, phenol and trikresol when injected intradermally and found that the glycerin in solutions of 5 per cent. or stronger would frequently produce swellings large enough to be confusing when injected in $\frac{1}{5}$ c.c. doses. The trikresol and phenol in $\frac{1}{2}$ per cent. solutions, on intradermal injection, did not produce swellings.

We also tried the effect of injecting 10 per cent. solutions of the precipitates, derived by treating concentrated glycerin bouillon with alcohol, in a manner similar to that used in producing precipitated tuberculin. These did not produce swellings large enough to be confused with an intradermal reaction.

Our observations in this respect corroborate the observations of Vallee, Deglaire and Herbet,[39] presented in *Recueil de Medicine Veterinaire,* of March 30, 1909. They state that many healthy cattle subjected to the intradermal test according to the method of Moussu and Mantoux[30] show in about 6 per cent. of the cases an immediate local swelling at periods of time varying from five to sixty minutes after injection. This swelling at the seat of the injection is edematous in character and varies in size from the dimensions of a hazelnut to that of a plum. It disappeared quickly, rarely persisting more than twenty-four hours, differing in this respect from the specific reaction in tuberculous animals, which is usually persistent. Some cases, however, in healthy cattle persist more than forty-eight hours. These authorities assume that the swelling is brought about in part by the glycerin or by certain salts in the bouillon and that it may be in part a reaction to a traumatism. They recommend the use of *precipitated tuberculin.* According to Mulford's *Veterinary Bulletin,* they recommend $\frac{1}{5}$ c.c. doses of $\frac{1}{2}$ per cent. solution.

Under certain conditions, when the intradermal is to be followed by a subcutaneous test, it might be desirable to use this weak solution of tuberculin as there would be less likelihood of its having an inhibitory effect on the subsequent test. In fact, Hammam and Wolman[10] claim there is reason to believe that the injection of $\frac{1}{10}$ c.c. dose of $\frac{1}{2}$ per cent. tuberculin in a human being may have a sensitizing effect, which will render a subsequent test more effective. We have no evidence to show that this holds true for cattle.

Foth[9] states that the dose used by the French authors was too small to get the maximum number of local reactions. This is probably true, but from our experiments we believe that the quantity of liquid injected should not exceed $\frac{1}{5}$ c.c. and that it is better to increase the concentration of the tuberculin instead of increasing the quantity of the dose. Most authorities prefer to use Koch's old tuberculin for the intradermal test and we would be inclined to agree in this if it were not for its glycerin content.

Koch's Old Tuberculin (*Tuberculin O. T. Original*). Hutyra and Marek[13] state that a 50 per cent. solution of Koch's old tuberculin, when injected intradermally, produces good, clear results in both positive and negative cases. Several veterinarians who have had extensive experience in the use of tuberculin inform me that the ordinary B. A. I. tuberculin undiluted, in doses of 2 to 5 drops, has given excellent results, and that from a long series of tests in actual practice they do not believe it necessary to use purified tuberculin.

Joseph[14] has stated that not over $\frac{1}{5}$ c.c. should be injected and we believe from our work that his suggestions should be followed, provided a strong solution of tuberculin is used. Joseph used $\frac{1}{20}$ c.c. of Koch's old tuberculin diluted with an equal amount of physiological salt solution, which would make a solution containing 25 per cent. glycerin.

We have tested nine hundred and eighty-seven (987) head of cattle, using Koch's old tuberculin after the method of Moussu and Mantoux.[30] From the number tested three hundred and seven (307) reacted with clear and positive results. We have concluded, however, after due experimentation and consideration of the recommendations of the investigators and firms above mentioned, that a strong solution of alcoholic precipitated tuberculin is preferable to Koch's old tuberculin for the intradermal test in cattle.

The summary given in Table I is of interest in considering the relative merits of the various kinds and strengths of tuberculin recommended for the intradermal method.

THE LOCAL REACTION TO THE INTRADERMAL INJECTION IN CATTLE. A positive intradermal reaction is indicated by a thickening of the subcaudal fold or the appearance at the point of injection of a characteristic sensitive swelling, varying in size from that of a small pea to that of an orange. The swelling may be either soft and edematous or hard and inflamed. A recognizable reaction may be present in the sixth hour but generally the reaction is first clear about the twelfth hour and continues to increase in size until the forty-eighth hour. In some instances we have observed that the early local reactions disappear before the forty-eighth hour, while in others delayed reactions have been noted which did not appear until the ninetieth hour. In order to be certain of every case, observations must be taken several times, preferably daily for four days.

TABLE I.—Results from the Intradermal Use of Various Solutions of Tuberculin.

Kind of tuberculin.	Dose.	Total cows tested.	Total reactions	Conclusions regarding the tuberculin.
Koch's old Tuberculin dilution 1 to 10 of physiological salt solution.	0.1 to 0.2 c.c.	987	307	Fairly satisfactory. Produces distinct local reaction swellings but the glycerin which it contains causes a swelling immediately after injection which occasionally persists long enough in healthy cattle to be confusing. Thermal reactions also occur with this dosage.
Concentrated tuberculin equal in strength to a 70 per cent. solution of Koch's old tuberculin.	0.1 to 0.2 c.c.	15	11	The tuberculin contains 35 per cent. glycerin. The glycerin content is objectionable.
Koch's old tuberculin undiluted.	0.1 c.c.	24	0	Used on 24 head of non-reacting healthy cattle. The swellings due to the glycerin in some cases were four inches in diameter and persisted over forty-eight hours.
Alcohol precipitated tuberculin 10 per cent. solution (100 milligrams per c.c. of physiological salt solution).	0.05 to 0.2 c.c.	214	25	This kind and strength of tuberculin is very satisfactory. It produces pronounced local and thermal reactions when injected intradermally in 0.1 c.c. doses. No local swellings occur in non-tuberculous cattle.
Alcohol precipitated tuberculin 2 per cent solutions (20 milligrams per c.c.).	0.2 c.c.	1150	487	Fairly satisfactory. Produces thermal as well as local reactions when injected intradermally.
Alcohol precipitated tuberculin ½ per cent. solution.	0.2 c.c.	134	35	Fairly satisfactory when the cattle are to be retested with stronger tuberculin. This strength of tuberculin produces moderate local and thermal reactions when injected intradermally.

Small indurations at the point of inoculation about the size of the head of a parlor match frequently occur in normal non-reacting cattle, but anything larger than this, which persists to the seventy-second hour, should be considered a positive reaction.

In recording reactions, a convenient method for comparison is to describe the size of the swellings as pea-size, hazelnut, walnut and hen's egg size. The exact size, if desired, may be measured by by means of calipers such as are shown in Fig. 2. Romer and Joseph consider that a thickening of the skin fold more than three millimeters larger than the thickness previous to injection should be considered a positive reaction. Cases in which the increase in thickness only amounts to three millimeters they consider doubtful and subject to a retest. In our work, however, we have found the measurement of the swelling was not of much assistance. Experience and practice will enable the operator to judge of the size of the swellings without measuring, although for the sake of accurate records we have made a practice of taking careful measurements.

In judging a local swelling, the observer should depend more upon the shape, appearance, tenseness, sensitiveness and location with respect to the exact point of injection, than upon the actual measurements. Only experience can teach an operator how to be certain of a positive reaction when the local swelling is small. This is especially true when tuberculin containing glycerin has been used.

THE THERMAL REACTION TO THE INTRADERMAL INJECTION IN CATTLE. Moussu and Mantoux[30] state that *no* thermal reaction follows their method of performing the test. On the contrary, we have found that tuberculous cattle usually do show a marked temperature reaction when injected intradermally with the dosage and strength of tuberculin recommended by these investigators. Moussu and Mantoux used tuberculin brute (Koch's old tuberculin) diluted with ten volumes of physiological salt solution. Their dose was from $\frac{1}{10}$ to $\frac{1}{5}$ c.c.

We have used this kind of tuberculin in testing 207 cattle and frequent temperature readings were taken after the intradermal injection; 124 showed a local reaction swelling. In 101 of these 124 cases distinct temperature reactions occurred. Three cows which showed a local, but no thermal reaction, were autopsied and found to be tuberculous. These cases are described in detail later.

The following table of twenty-one tests selected at random from the 101 cases above mentioned shows the typical height of the thermal reaction to Moussu and Mantoux's method.

Table II.—Typical Cases Selected to Show that Cattle React Thermally to the Intradermal Test.

Ear tag No.	Intradermal Test Record.												Subcutaneous Test Record.											Reactions.
	Temperatures, May 14.												Temperatures, May 20.											
	Before injection.		In-jected.	After injection.							Test re-sult.	Swellings, size and description.	Before injection.		In-jected.	After injection.							Test re-sult.	
	Min.	Max.	Dose, .2 c.c.	6 h.	9 h.	12 h.	14 h.	16 h.	18 h.	20 h.			Min.	Max.	Dose, 2 c.c.	8 h.	10 h.	12 h.	14 h.	16 h.	18 h.	20 h.		
31	101.1	101.2	Koch's Old Tuberculin diluted 1 to 10. This is the dose of tuberculin recommended by Moussu.	102.4	104.8	106.6	105.0	103.1	101.0	101.4	+	40 mm., orange, hard.	101.1	101.4	Koch's Old Tuberculin diluted 1 to 10.	104.6	105.0	105.0	105.4	105.1	105.6	106.7	+	Reacted to both tests.
32	100.8	101.8		102.8	104.0	103.6	103.3	102.0	101.4	100.8	+	20 mm., walnut, hard.	100.0	101.0		102.4	103.6	103.9	104.0	102.4	101.6	..	+	" "
36	101.6	103.2		103.9	104.6	105.4	104.5	104.5	104.2	100.1	+	13 mm., hazelnut medium.	101.2	102.1		104.2	105.4	105.2	104.2	103.4	104.4	104.6	+	" "
46	100.6	101.0		101.8	101.4	104.2	103.6	103.2	100.0	100.7	+	15 mm., walnut, medium.	100.8	101.4		101.5	104.6	104.8	103.2	101.8	103.5	102.8	+	" "
48	101.4	101.3		102.4	102.7	104.8	104.0	103.6	102.9	100.6	+	13 mm., hazelnut, medium.	101.6	102.7		104.3	105.8	103.6	104.4	104.6	104.8	104.3	+	" "
56	101.2	101.8		103.2	106.3	105.6	105.6	104.0	102.2	101.8	+	20 mm., walnut, medium.	101.1	101.8		103.7	104.4	105.8	103.5	103.2	102.6	..	+	" "
66	100.9	102.0		103.0	105.1	106.0	103.0	102.0	101.4	100.4	+	20 mm., walnut, medium.	100.5	101.6		103.1	105.0	105.6	104.7	104.0	104.8	103.6	+	" "
72	101.8	101.0		102.0	101.6	104.0	104.2	103.6	101.0	101.0	+	10 mm., pea, medium.	100.6	101.8		101.4	102.2	104.4	104.3	103.5	104.7	102.6	+	" "
74	101.4	101.6		101.2	102.0	105.5	105.0	102.8	102.8	100.7	+	10 mm., pea, hard.	100.6	101.6		104.6	105.0	106.0	103.0	103.2	104.4	104.0	+	" "
76	101.0	102.4		102.6	105.2	105.2	105.2	104.0	103.6	101.4	+	20 mm.. walnut, medium.	101.4	101.6		105.8	105.6	103.8	102.8	102.6	103.0	..	+	" "
80	101.4	102.0		104.0	103.2	102.2	101.8	100.8	100.6	100.4	+	10 mm., pea.	101.5	102.0		103.2	103.3	103.9	103.2	102.6	101.9	..	+	" "
82	100.4	101.5		103.1	103.9	105.0	106.0	104.8	104.4	102.8	+	15 mm., walnut, medium.	101.2	102.0		104.2	106.0	106.0	105.0	104.4	103.6	..	+	" "
84	100.8	101.5		102.6	105.0	106.2	105.0	104.5	102.4	101.8	+	40 mm., orange, hard.	100.8	101.7		106.1	106.2	104.0	103.0	102.3	102.0	..	+	" "
85	100.6	101.4		104.0	105.5	105.6	104.6	103.8	103.1	102.8	+	25 mm., egg, medium.	100.6	101.2		105.4	103.8	102.7	100.8	101.4	100.3	..	+	" "
95	101.6	101.6		102.8	101.4	106.8	104.6	104.0	102.5	101.6	+	40 mm., orange, hard.	100.4	101.7		104.9	104.1	104.2	103.2	101.8	103.6	103.5	+	" "
97	101.6	101.6		102.0	101.4	105.6	105.6	104.0	100.6	99.9	+	10 mm., pea, hard.	101.2	101.2		101.1	102.8	104.2	104.8	103.8	102.4	..	+	" "
99	100.6	101.1		103.1	104.8	107.7	101.4	101.2	101.2	100.0	+	20 mm., walnut, medium.	99.8	101.4		104.2	105.6	105.4	104.6	104.6	104.0	104.4	+	" "
103	101.8	102.5		103.1	103.3	106.6	106.5	105.4	105.4	100.1	+	13 mm., hazelnut, medium.	100.4	102.8		102.2	104.0	106.0	106.0	105.8	105.2	104.0	+	" "
113	101.3	102.0		102.5	103.2	105.4	105.1	102.4	102.4	102.0	+	20 mm., walnut. medium.	101.2	101.4		102.6	104.6	105.9	103.7	102.1	102.2	..	+	" "
114	100.2	101.4		104.4	104.2	102.4	102.6	102.0	102.0	101.7	+	15 mm., walnut, medium.	100.6	103.0		105.0	104.4	102.4	101.8	101.0	99.8	..	+	" "
104	101.1	101.2		102.2	104.6	106.2	105.8	103.0	103.0	100.0	+	13 mm., hazelnut, medium.	101.4	100.4		101.0	101.5	101.8	101.2	101.0	103.4	102.7	—?	Intradermal, + subcutaneous, —?

In Table III are some interesting results with solutions of alcoholic precipitated tuberculin:

It would appear from the above results that the intradermal test has a slightly depressing effect on the reaction to an intradermal injection six days later. The animals described in Table III were presumably healthy calves which, on June 12, 1913, had been treated with an injection of human tubercle bacilli (Culture Ravenel M) after the manner of Pearson and Gilliland.

ACCURACY OF THE INTRADERMAL COMPARED WITH THE SUBCUTANEOUS METHOD. A comparison of the accuracy of these two methods is difficult. Out of the 763 comparative tests made, we have observed 24 cattle that reacted to the intradermal method and failed to react to the subcutaneous method.[1] These cases are discussed more in detail in the section of this paper which deals with latent cases. On the other hand we have observed 18 cattle which reacted thermally to the subcutaneous test, but failed to react locally to an intradermal injection.

Table IV is a summary of the data which we have compiled from our own tests and from the reports of various other investigators, concerning the comparative accuracy of the intradermal and subcutaneous tests.

In addition to the data in Table IV, the following reports are of interest.

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[1] In one case a cow was tested twice by the subcutaneous method and failed to react, but she reacted locally to an intradermal injection given at this second test. Shortly after the second test she was injected by the intradermal method and gave a marked local reaction. On being retested by the intradermal method a month later she again reacted locally. She was kept under observation for a year and subjected three times to the subcutaneous test at intervals of about four months but failed to react. At the time of the last subcutaneous test an intradermal injection of $\frac{1}{10}$ c.c. of (Koch's old tuberculin dilution 1 to 10) the same tuberculin used for the subcutaneous test was given simultaneously with the 2 c.c. injected subcutaneously. A distinct local reaction occurred (but there was no rise in temperature). On autopsy this cow was found to have small encapsulated tuberculous lesions in the mesenteric and retropharyngeal lymph glands. One cow, to which the intradermal and subcutaneous tests were administered simultaneously, reacted locally to the intradermal but showed no rise in temperature. This cow was found to be tuberculous on autopsy. Another cow which received the intradermal and subcutaneous tests simultaneously was observed to have a temperature rise typical of a tuberculin reaction, but no local reaction occurred at the point of intradermal injection. On autopsy the cow was found tuberculous. Six cows which reacted locally to the intradermal test, but failed to react thermally to a subsequent subcutaneous test, were autopsied and found tuberculous.

TABLE III.—The Results of Successive Intradermal Tests with Precipitated Tuberculin.

	Dose, 0.2 c.c. of 0.5 per cent. purified tuberculin. Date, July 30, 1913.											Dose, 0.1 c.c. of 10 per cent. purified tuberculin. Date, August 5, 1913.									Test results.			
	Temperatures.									Test result.	Swellings, size and description.	Test result.	Temperatures.						Result.	Swellings, size and description.	Result.	1st test.		2d test.	
	Before injection.		After injection.										Before injection.	After injection.											
	Min.	Max.																				Temp.	S.	Temp.	S.
1	102.0	102.8	102.7	102.9	104.5	106.2	106.2	106.2	104.6	+	55 mm., orange, hard.	+	102.4	104.5	104.4	102.9	102.6	102.8	+	20 mm., walnut, soft.	+	+	+	+	+
6	101.4	102.4	103.2	104.4	106.0	105.6	105.8	105.6	102.4	+	38 mm., orange, hard.	+	102.6	105.6	104.4	103.2	102.6	101.8	+	15 mm., walnut, hard.	+	+	+	+	+
8	101.4	103.6	102.6	104.2	105.6	106.0	105.6	105.0	101.8	+	20 mm., walnut, hard.	+	102.4	104.2	102.8	102.6	102.3	102.9	+	20 mm., walnut, hard.	+	+	+	+	+
10	101.6	103.2	103.2	104.6	105.4	105.6	105.4	104.6	103.4	+	20 mm., walnut, medium.	+	103.2	103.6	103.0	102.4	102.0	102.0	?	16 mm., hazelnut, hard.	+	+	+	?	+
12	101.4	102.6	102.0	101.6	102.0	102.2	103.6	103.2	102.2	+	12 mm., hazelnut, soft.	+	102.6	103.6	102.6	101.4	101.4	101.1	?	12 mm., hazelnut, hard.	+	+	+	?	+
19	101.4	101.6	100.6	101.0	101.8	102.2	102.6	104.0	103.0	+	18 mm., walnut, medium.	+	101.6	101.0	100.8	101.2	101.0	..	–	20 mm., walnut, medium.	+	+	+	–	+

TABLE IV.—Summary of Data from Various Investigators Concerning the Comparative Accuracy of the Intradermal and Subcutaneous Methods.

Observer.	Method.	Tuberculin.	Maximum dose.	Total cattle tested.	Reactors to intradermal tests.	Reactors to subcutaneous tests.	Remarks and conclusions.
Moussu and Mantoux	Subcaudal	10% O. T.	0.20 c.c.	70	70	70	Verified in most instances by autopsy; agreement of tests in every case. Intradermal equals subcutaneous test in accuracy.
Vallee	Subcaudal	10% O. T.	0.20 c.c.	521	494	506	12 cattle with a positive thermal reaction gave no intradermal reaction.
Ward and Baker	Subcaudal	10% O. T.	0.20 c.c.	157	. . .	. . .	Verified by autopsy in 100 cases. Intradermal compares favorably with subcutaneous. Not reliable following the subcutaneous.
Zschokke	Tail and neck	10% O. T.	0.20 c.c.	300	. . .	. . .	Neck and tail injections equal in value. 85 per cent. of known tubercular cattle reacted to the intradermal.
Longley and McKenna	Subcaudal	0.5% purified	0.20 c.c.	1500	. . .	. . .	Equals the subcutaneous test in accuracy.
Romer and Joseph	Neck	50% O. T.	0.05 c.c.	126	78	78	One out of 79 tuberculous animals failed to react to the intradermal test.
Norgaard and Case	. . .	B. A. I. tuberculin concentrated to one-third original volume	0.20 c.c.	. . . .	27	29	The intradermal test is more satisfactory than the subcutaneous and its substitution for the old method is fully warranted. Two cases failed to react to the intradermal for reasons fully explained.

Luckey,[20] Sheldon,[38] Brown,[2] Kinsley and others in Missouri report after having tested over 30,000 head by the intradermal method that this test is preferable under average conditions when applied by a skilled operator.

Hutyra and Marek[13] state that it is desirable in practice where large herds are to be tested to apply a local test first, preferably the intradermal or ophthalmic test, and after the great majority of tuberculous animals have been recognized the remainder of the herd may be subjected to the subcutaneous test.

Martin[25] recommends the intradermal test for general practice.

Melvin,[26] of the United States Bureau of Animal Industry, reports that the ophthalmic and intradermal tests for the detection of tuberculosis in cattle have received attention. He says: "These methods thus far have not proved sufficiently superior to the subcutaneous injection of tuberculin to warrant their general application in practice, although they are still being tested whenever suitable opportunities are offered. A special preparation, known as "phymatin," has been used in the ophthalmic test and has given better results than the alcoholic-precipitated tuberculin. The ophthalmic and intradermal methods of applying the tuberculin test possess so many advantages, especially in the simplicity of reading the results, that the absolute acceptance of either one would be a great aid in the eradication of tuberculosis. Both methods obviate the laborious operation of taking temperatures repeatedly during the day after the injection, and no preliminary temperatures are required.

Littlejohn[15] advocates the application of several local tests simultaneously.

Lignieres[18] recommends the simultaneous use of the intradermal, ophthalmic and subcutaneous tests.

Foth[9] reports that he was able to detect only about one-half the tuberculous individuals in Danish quarantine cattle by the intradermal method. He states that the subcutaneous injection has a modifying effect on local tests applied simultaneously.

Assmann[1] has observed in certain cases, where ophthalmic and thermal reactions occur at the same time, that the local reaction weakened as the thermal reaction gained strength.

Norgaard[32] reports results in the use of the intradermal method which compare favorably with the subcutaneous in accuracy.

In the following table (V) the tests which we have made are classified according to the kinds of tuberculin used:

TABLE V.—Summary of Data Concerning the Comparative Accuracy of the Intradermal and Subcutaneous Methods.

Method.	Tuberculin.	Maximum dose.	Total cattle tested.	Reactors to intradermal tests.	Reactors to subcutaneous tests.	Remarks and conclusions.
Subcaudal simultaneously with subcutaneous.	10% O. T.	0.2 c.c.	332	3	2	Two cows with a positive intradermal reaction gave no thermal reaction. One cow with a positive thermal reaction gave no intradermal reaction.
Subcaudal followed by subcutaneous in 3 to 30 days.	10% O. T.	0.2 c.c.	262	162	157	Seventeen cattle with positive intradermal reactions gave no reaction to a subsequent subcutaneous test. Five were found tubercular. Twelve cattle with positive subcutaneous reactions had given no intradermal reaction.
Subcaudal followed by subcutaneous in 3 to 30 days.	2% to 10% purified.	0.05 to 0.2 c.c.	169	20	19	Seven cattle with a positive intradermal reaction gave no thermal reaction. Six cattle with a positive thermal reaction gave no intradermal reaction.
Subcaudal and in neck in various ways.	Various kinds and strengths	0.05 to 0.2 c.c.	1761[1]	680	No subcutaneous test was made	Tuberculin containing glycerin is unsatisfactory. Tuberculin containing less than 2 per cent. purified tuberculin when administered intradermally often produced indistinct unsatisfactory reactions. Four out of eleven reactors to concentrated tuberculin, containing 35 per cent. glycerin injected intradermally, failed later to react subcutaneously. Three of these were autopsied and tuberculous lesions were found in two.
Totals,			2524	865		
Subtracting for retests,			410	119		
Actual number of animals tested,			2114	746		

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[1] Including 165 retests.

In testing eleven herds, containing in all 431 cattle, 184 of which reacted locally to the intradermal test, the results were checked by retesting all the animals in from three to thirty days by the subcutaneous method. 24 of the animals which had reacted to the intradermal method failed to react to the subcutaneous test, and 18 reactions occurred in response to the subcutaneous method in animals which had not reacted to the intradermal test. Autopsies of some of these cows are described later in this paper. The following table shows the results of the tests in these eleven herds:

TABLE VI.—The Comparative Results of Intradermal and Subcutaneous Tests on Eleven Herds.

Herd No.	Total cows tested.	Cows that reacted to intradermal test.	Cows that reacted to subcutaneous test.	Cows that reacted to intradermal but not to subcutaneous test.	Cows that reacted to the subcutaneous but not to the intradermal test.	Interval between the intradermal and subcutaneous
I	8	7	8	0	1	7 days
II	3	3	3	0	0	12 "
III	2	2	2	0	0	10 "
IV	2	2	2	0	0	30 "
V	133	12	15	3	6	20 "
VI	35	12	11	2	1	3 "
VII	15	11	7	4	0	3 "
VIII	15	7	3	4	0	3 "
IX	21	1	1	0	0	15 "
X	25	1	0	1	0	6 months
XI	172	124	124	10	10	7 days
Totals	431	182	176	24	18	

In herds V, VI and VII it is unfair to judge the results from the subcutaneous test without considering the possibility of a modifying effect from the intradermal reaction just previous. We believe that the above results should be interpreted as indicating that the two tests are about equal in accuracy.

In testing four herds, containing in all 283 cattle, by both the intradermal and subcutaneous methods simultaneously, 3 cattle reacted locally to the intradermal test and 2 reacted thermally; 2 of the animals which reacted locally failed to show a thermal reaction and 1 of the animals which reacted thermally failed to show a local reaction. Autopsies were performed in all the reacting cases and it was found that these animals had tuberculous lesions. The following table shows the results of the tests in these four and two additional herds:

TABLE VII.—Results of Simultaneous Application of Intradermal and Subcutaneous Tests.

Herd number.	Total cattle tested.	Cattle that reacted locally.	Cattle that reacted thermally.	Cattle that reacted locally but not thermally.	Cattle that reacted thermally but not locally.
XII	209	1	1	1	1
XIII	33	1	0	1	0
XIV	20	0	0	0	0
XV	21	1	1	1	1
XVI	8	0	0	0	0
XIX	41	0	0	0	0
Totals	332	3	2	3	2

In six herds where we have applied intradermal tests to cattle, temperatures were taken, at two-hour intervals, from the eighth to the twentieth hour after the intradermal injection, and, in addition, in Herd No. XI from the second to the twentieth hour, and in Herd No. XVII from the eighth to the twenty-eighth hour.

TABLE VIII.—Table Showing Tests in Six Herds in which Thermal Reactions Usually Resulted from an Intradermal Injection.

Herd number.	Cows tested.	Tuberculin.	Cattle reacted locally.	Cattle reacted thermally to intradermal injection.	Cattle that reacted locally but not thermally.	Cattle that reacted thermally but not locally.
IX	21	2% precipitated.	1	1	0	0
X	25	10% O. T.	1[1]	0	1	0
XI	172	10% O. T.	124	102	22	0[2]
XVII	23	10% precipitated.	16	16	0	0
XVIII	4	10% precipitated.	1	1	1	0
XIV	14	0.5% precipitated.	6	6	0	0
XIV[3]	14	10% precipitated.	4	4	1	0
Total	273	. . .	153	130	25	0

DESCRIPTION OF CASES WHICH REACTED TO THE INTRADERMAL BUT DID NOT REACT TO THE SUBCUTANEOUS TEST. The following detailed history of seven cows which reacted to the intradermal but not to the subcutaneous test is submitted as proof that cattle having latent, slight or inactive lesions of tuberculosis may fail to react to the subcutaneous test, but may react to the intradermal. Except when otherwise stated, all tests in these cases were made with Koch's old tuberculin, dilution 1 to 10 of physiological salt solution. The dose for the intradermal tests was $\frac{1}{5}$ c.c. The dose for the subcutaneous tests varied from 2 to 4 c.c.

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[1] See autopsy notes on cow Peggy.

[2] See Table III, cow 19.

[3] Retest.

Cow I. Peggy. Grade Holstein. Good physical condition throughout the time she was under observation.

October 10, 1911. Tested by the subcutaneous method. No reaction.

March 2, 1912. Tested simultaneously by the subcutaneous and intradermal methods. No thermal reaction to the subcutaneous. Strong reaction to the intradermal.

April 2. Tested by the intradermal method. Strong reaction.

July 20. Tested by the subcutaneous method. No reaction.

October 4. Tested by the subcutaneous method. No reaction.

January 1, 1913. Tested by the intradermal method. Strong reaction.

March 8. Tested simultaneously by the subcutaneous and intradermal methods. No thermal reaction to the subcutaneous. Slight reaction to the intradermal.

July 10. Tested by the intradermal method using $\frac{1}{5}$ c.c. of 10 per cent. solution of purified tuberculin. Slight reaction.

July 12. This cow was slaughtered for beef under municipal inspection. One of the retropharyngeal lymph nodes contained a tuberculous nodule five millimeters in diameter with a wall one millimeter thick composed of grayish connective-tissue-like substance. In the center was a small amount of caseous yellow material, partially calcified. In one of the mesenteric lymph nodes a lesion very similar in size and appearance was found. No other lesions were discovered. A guinea-pig was inoculated with the tissue and on autopsy August 13, 1913, was found to be extensively tuberculous.

Cow II. Ear Tag No. 1649. Fair physical condition.

May 6, 1913. Tested by intradermal method. Positive reaction.

May 8. Tested by subcutaneous method. No reaction.

June 6. Tested by ophthalmic method. No reaction.

June 23. Tested by ophthalmic method, 2 per cent. purified tuberculin. No reaction.

June 26. Tested by intradermal method, 0.5 per cent. purified tuberculin. Positive reaction.

June 29. Tested by intradermal method, 2 per cent. purified tuberculin. Positive reaction.

July 10. Tested by intradermal method, 10 per cent. purified tuberculin. Positive reaction.

July 12. Killed for beef under federal inspection. Four tuberculous nodules similar in appearance to those in Cow I (Peggy) were found in the bronchial lymph nodes. No other tuberculous lesions were discovered.

Cow III. Ear Tag No. 6. Aged, fair physical condition.

May 6, 1913. Tested by intradermal method. Positive reaction.

May 8. Tested by subcutaneous method. No reaction.

June 6. Tested by ophthalmic method. Positive reaction.

June 23. Tested by ophthalmic method, 2 per cent. purified tuberculin. No reaction.

June 26. Tested by intradermal method, 0.5 per cent purified tuberculin. Positive reaction.

June 29. Tested by intradermal method, 2 per cent. purified tuberculin. No reaction.

July 10. Tested by intradermal method, 10 per cent. purified tuberculin. Positive reaction.

July 12. Killed for beef under municipal inspection. The anterior and posterior mediastinal lymph nodes were enlarged to three times normal size and contained dry calcareous and fibrous tuberculous lesions apparently inactive and of long standing. No other lesions were found.

Cow IV. Ear Tag No. 1219.

May 6, 1913. Tested by intradermal method. Positive reaction.

May 8. Tested by subcutaneous method. No reaction.

June 6. Tested by ophthalmic method. Positive reaction.

June 23. Tested by ophthalmic method, 2 per cent. purified tuberculin. No reaction.

June 26. Tested by intradermal method, 0.5 per cent. purified tuberculin. Positive reaction.

June 29. Tested by intradermal method, 2 per cent. purified tuberculin. Positive reaction.

July 10. Tested by intradermal method, 10 per cent. purified tuberculin. Positive reaction.

July 12. Killed for beef under municipal inspection. Acute lesions of tuberculosis involving both anterior lobes of the lungs and the mediastinal and bronchial lymph nodes.

Cow V. Ear Tag No. 1206. Good physical condition.

May 6, 1913. Tested by intradermal method. Strong positive reaction.

May 8. Tested by subcutaneous method. No reaction.

June 6. Tested by ophthalmic method. No reaction.

June 23. Tested by ophthalmic method, 2 per cent purified tuberculin. No reaction.

June 26. Tested by intradermal method, 0.5 per cent. purified tuberculin. No reaction.

June 29. Tested by intradermal method, 2 per cent. purified tuberculin. Positive reaction.

July 10. Tested by intradermal method, 10 per cent. purified tuberculin. Positive reaction.

July 12. Killed for beef under municipal inspection. No tuberculous lesions were found. An unusually careful search was made from a meat inspection standpoint but it was impracticable to strip the meat from the bones and search the interior of the bones and joints and certain other places where small tuberculous lesions might have existed.

Cow VI. Ear Tag No. 1218.

May 6, 1913. Tested by intradermal method. Positive reaction.

May 8. Tested by subcutaneous method. No reaction.

June 6. Tested by ophthalmic method. No reaction.

June 23. Tested by ophthalmic method, 2 per cent purified tuberculin. No reaction.

June 26. Tested by intradermal method, 0.5 per cent purified tuberculin. Positive reaction.

June 29. Tested by intradermal method, 2 per cent. purified tuberculin. Positive reaction.

July 10. Tested by intradermal method, 10 per cent. purified tuberculin. Positive reaction.

July 12. Killed for beef under municipal inspection. Soft caseous tuberculous lesions in the liver and between the liver and the diaphragm. One mesenteric lymph node was caseous.

Cow VII. Ear Tag No. 68. Fair physical condition.

May 6, 1913. Tested by intradermal method with 2 per cent. purified tuberculin. Positive reaction.

May 8. Tested by subcutaneous method with 2 per cent. purified tuberculin. No reaction.

June 6. Tested by ophthalmic method with 2 per cent. purified tuberculin. No reaction.

June 23. Tested by ophthalmic method with 2 per cent. purified tuberculin. No reaction.

June 26. Tested by intradermal method with 0.5 per cent. purified tuberculin. Positive reaction.

June 29. Tested by intradermal method with 2 per cent. purified tuberculin. Positive reaction.

July 10. Tested by intradermal method with 10 per cent. purified tuberculin. Positive reaction.

July 12. Killed for beef under federal inspection. Tuberculous lesions were present in the anterior lobes of both lungs and in the bronchial and retropharyngeal lymph nodes.

Cow VIII. Ear Tag No. 1213.

May 6, 1913. Tested by intradermal method. Positive reaction.

May 8. Tested by subcutaneous method. No reaction.

June 6. Tested by ophthalmic method. Positive reaction.

June 23. Tested by ophthalmic method, 2 per cent purified tuberculin. No reaction.

June 26. Tested by intradermal method, 0.5 per cent. purified tuberculin. Positive reaction.

June 29. Tested by intradermal method, 2 per cent. purified tuberculin. No reaction.

July 10. Tested by intradermal method, 10 per cent. purified tuberculin. Positive reaction.

July 12. Killed for beef under municipal inspection. Two small tuberculous nodules in the liver, each about 1 cm. in diameter, having firm fibrous walls 1 mm. in thickness. Contents yellow, firm, sprinkled with points of deeper yellow color. Calcification was not present and the tissue was not entirely broken down.

Cow No. IX. Ear Tag No. 1638 (Timm).

January 14, 1912. Tested by subcutaneous method. No reaction.

June 6. Tested by subcutaneous method. No reaction.

January 3, 1913. Tested by subcutaneous method. No reaction.

June 6. Tested by subcutaneous method. No reaction.

June 6. Tested by intradermal method. Strong reaction.

July 7. Autopsied. In the mediastinal lymph nodes were two tuberculous lesions each about two-thirds the size of the fist, encapsulated and partially liquefied. In a mesenteric lymph node was a soft caseous tuberculous lesion two centimeters in diameter.

DISCUSSION OF CASES WHICH REACTED THERMALLY TO THE SUBCUTANEOUS BUT SHOWED NO LOCAL REACTION TO THE INTRADERMAL TEST. We have observed 19 cases which showed a thermal reaction to the subcutaneous method, but no local reaction to the intradermal method. This should be considered in judging the comparative value of the intradermal test. Four of the above-mentioned 19 cows were tested by both methods on the same day. One of these was afterward autopsied and found to contain a few active tuberculous lesions. Following is her history:

Cow Test No. 134. Ear Tag No. 2187 (Timm).

January 5, 1913. Tested by subcutaneous method. No reaction.

June 27. Tested by subcutaneous method. Positive reaction.

June 27. Tested by intradermal method. No reaction.

July 7. Autopsied. The lungs contained one tuberculous lesion the size of a half-dollar, encapsulate with caseous center. One bronchial gland contained a calcified tuberculous lesion five millimeters in diameter. The liver contained two well-healed lesions, averaging one centimeter in diameter.

The failure of these four cows to react locally might be accounted for by the theory that a local reaction is weakened or disappears when it occurs simultaneously with a temperature reaction. The observations of Foth and Assman, already quoted, are of interest in this connection. However, we have observed so many instances in which marked thermal and intradermal reactions occurred simultaneously from an intradermal injection that more evidence is desirable before accepting this theory. We are inclined to attribute the failures of the intradermal test to the well-supported theory that no form of the tuberculin test will detect every case of tuberculosis in cattle, and that the maximum number of reactors can only be obtained by applying local tests first and following them by the subcutaneous method after an interval of at least seven days. Assman[1] has pointed out that the proportion of questionable, or faulty, diagnoses amounts to over 13 per cent. for the thermic, while he admits only 9 per cent. of failures with the ophthalmic test.

Hastings[12] states that probably in 15 per cent. of the animals examined in badly infected herds the test is in error. By far the greater number of errors is due to the non-reaction of tubercular animals. Both the thermic and intradermal tests occasionally fail to produce reactions in tuberculous cattle under circumstances that exclude an explanation on the ground that the disease was either latent or so advanced that the cattle would not react. The possibility of the animals having been rendered insusceptible by previous injections of tuberculin can also be eliminated.

THE COMPARATIVE ACCURACY OF THE INTRADERMAL AND OPHTHALMIC METHODS IN TESTING CATTLE. Six state veterinarians have recently written us that they consider the intradermal method preferable to the ophthalmic. Hutyra and Marek also indicate a preference for the intradermal over the ophthalmic. Our data on this point is rather meager. In tests on eleven known tuberculous animals with 10 per cent. solutions of Koch's old tuberculin our results were unsatisfactory, being negative in all instances. However, we obtained satisfactory positive results with 10 per cent. solutions of alcohol-precipitated tuberculin in 17 head of known tuberculous cattle. In one instance a cow reacted to the ophthalmic test, but failed to react to either the intradermal or subcutaneous tests. As yet we have not been able to obtain this animal for autopsy. In testing range cattle we have found it easier to apply the intradermal than the ophthalmic test.

USE OF THE INTRADERMAL TUBERCULIN TEST ON SWINE. At the University of California Hog Serum Laboratory the intradermal test is used as a matter of routine on all hogs purchased. The test is very satisfactory, the reactions usually being larger in size than in cattle. A dose of at least $\frac{1}{5}$ c.c. should be used. We are undecided as to the best place to make the injection. Injections into the skin of the edge of the ear are very easily seen. However, when the injection is made at the base of the ear the swellings are often larger. Tuberculous hogs show a thermal as well as a local reaction to $\frac{1}{5}$ c.c. doses of a 10 per cent. solution of alcoholic precipitated tuberculin.

ADVANTAGES OF THE INTRADERMAL TEST AND CONDITIONS UNDER WHICH IT IS PREFERABLE. Since the reaction to tuberculin when injected by the intradermal method depends on a swelling at point of injection and not on thermal manifestations it is to be preferred to the subcutaneous injection under all conditions that are liable to modify the tuberculin temperature curve. In testing wild range cattle, even if it is possible to restrain them no reliance can be placed on the reaction as shown by the tuberculin temperature curve.

In calves under six months of age there is liable to be a difference of two or more degrees in the normal temperature of two consecutive days. The temperature of some cows is easily influenced by climatic changes, also by changes in handling and feeding. We deem it advisable to test by the intradermal method, if the temperature of the air where the cattle are confined exceeds 100° F., or in cold weather if the animals will be compelled to stand in a draught. Cattle from a long journey by road or rail are apt to have an abnormal temperature.

If an animal reacts locally there is a record left at the point of injection in the form of a swelling; this swelling being demonstrable in some instances three weeks after injection.

The local intradermal reaction is not affected by advanced pregnancy, recent parturition or the period of estrum. We hesitate to mention this as an advantage over the subcutaneous method, however, for in our experience in testing numerous cows in this condition we have not observed that the reliability of the subcutaneous test was affected.

Although we have reason to believe that the intradermal method modifies to some extent the results of a subsequently performed subcutaneous test, its effect is certainly not as pronounced as a previous subcutaneous test. When cattle are to be retested a weak solution (0.5 per cent. precipitated tuberculin) can be used. We believe that the intradermal test can always be satisfactorily substituted for the subcutaneous provided a strong tuberculin (5 per cent. solution of precipitated) is used for the intradermal injection and temperatures taken as if it were a regular subcutaneous test. We believe that when performing the test in this way it would be permissible to take temperatures only on those cattle that do not show a local reaction. In testing large numbers this would be a great saving of labor without any injury to accuracy. In fact, we are convinced that when performed in this way on large numbers of tuberculous cattle more infected animals will be detected than when dependence is placed on temperature reaction alone.

SUMMARY. In all, 2524 intradermal tests have been made on 2114 cattle, 746 of which reacted, and there has been an opportunity to check these results by autopsy in 116 cases and by the discovery of lesions on physical examination in 30 additional cases.

To 185 cattle that reacted to the intradermal test the subcutaneous test was subsequently applied and 176 cattle reacted. 25 cattle with a positive intradermal reaction gave no thermal reaction to the subsequent subcutaneous test. It was possible to autopsy only 7 of these which failed to react to the subcutaneous method, but in 6 out of the 7 tuberculous lesions were found. 19 cattle which failed to react to the intradermal test subsequently reacted to the subcutaneous test. These latter were all tested with a 10 per cent. solution of Koch's old tuberculin. In no instance in our experience have tuberculous cattle failed to react to the intradermal test when strong solutions of alcoholic precipitated tuberculin were used.

In tests on 332 cattle by both the intradermal and the subcutaneous methods simultaneously, 2 cattle reacted to the intradermal but failed to react to the subcutaneous method. On autopsy they were found to be tuberculous. 1 cow that reacted to the subcutaneous method, but showed no swelling at the point of intradermal injection, was also found on autopsy to be tuberculous.

Cattle which react to the intradermal test with local swellings usually have also a thermal reaction similar to that produced by the ordinary subcutaneous injection. The intradermal test is unreliable when applied a few days after a subcutaneous injection. The time limits under which this holds true have not been determined.

The intradermal test appears to have some modifying effect on a subsequent test by either the intradermal or subcutaneous methods, but this is not so pronounced as that produced by the usual subcutaneous injection.

The thermal reaction which accompanies the intradermal injection usually subsides in twenty hours, but it seems desirable not to apply the subcutaneous test for several days after the intradermal, the longer the interval the better.

The subcaudal fold is a more suitable point for the intradermal injection than the neck.

Our results with Koch's old tuberculin in 10 per cent. solutions and with alcoholic precipitated tuberculin in 0.5 per cent. solutions compare favorably in accuracy with the usual subcutaneous method. A more satisfactory method, however, is to use $\frac{1}{5}$ c.c. intradermal doses of alcoholic precipitated tuberculin in 5 per cent. solutions (50 milligrams of dry tuberculin to the c.c. of physiological salt solution) and take temperatures as in the usual subcutaneous test. With this kind and strength of tuberculin the local reactions are more pronounced and the thermal reactions are as characteristic as those that occur from subcutaneous injections.

Some tuberculous cattle react locally to the intradermal test, but fail to react thermally to the subcutaneous test, while others which react thermally fail to react locally. Obviously, then, it is necessary to use both tests in order to detect the maximum number of reacting cattle.

The procedure in injecting cattle is not difficult, provided needles of the proper length are used. To obtain the best results the tuberculin must be injected into the lower layers of the skin or into the subdermal connective tissue. The application of strong disinfectants to the site of injection should be avoided. It requires considerable experience to correctly interpret the local swellings. This is especially true when tuberculin containing glycerin is used.

We do not advocate the substitution of the intradermal for the subcutaneous method by a veterinarian until he has become skilled in its use by practice and observation. The practitioner can easily accomplish this in the routine of his work by applying the two tests simultaneously. Such a procedure cannot injure the accepted subcutaneous method in any way, although it may modify the local intradermal swellings to some extent.

Our observation of the fact that cattle having small, latent, or arrested lesions will sometimes react to the intradermal and not to the subcutaneous test suggests the possibility of differentiating between latent and acute infections by combining the two tests.

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At the conclusion of Dr. Haring's paper, Dr. Ellis, of the Committee on Local Arrangements, made announcements as to where to find the boat chartered to take the members of the Association on an excursion Thursday afternoon.

THE CHAIRMAN: There is still another paper. Dr. Ward will be given an opportunity to present his paper. The time is limited and I will ask him to be as brief as possible.

CONTROL OF TUBERCULOSIS IN MINNESOTA PURE-BRED HERDS

By S. H. Ward
St. Paul, Minn.

It must be acknowledged, the pure-bred animal is the disseminator of bovine tuberculosis, and if the disease is to be controlled the first step must be the eradication of the disease from among those animals which are the foundation of our cattle industry.

Attention has been directed on previous occasions, by the writer, regarding attempts to control tuberculosis having failed because of the too extensive and sweeping operations put into force. To prevent such repetitions, which tend to discourage breeders and those interested in the control of the disease, and in addition the useless expenditure of public money by indiscriminately testing here and there a few herds, only to have these herds harbor the infection through latent or incubative cases, which later would spring into activity, making the first efforts of eradication futile, considerable thought and attention was directed as to the best way of preventing the spread of tuberculosis and at the same time accomplishing actual results.

Realizing as we did the great prevalence of the disease among pure-bred cattle, and recognizing pure-bred animals were sold for founding new herds or improving grade herds, it was deemed necessary to adopt some measure which would prevent and cut off the main source of the spread of the disease, while its ultimate eradication from our cattle with our present knowledge and resources is remote. The campaign, which began some three years ago, has been carried along with the coöperation of the breeders. It must be acknowledged that conditions were met which at times were discouraging to owners, yet good judgment was shown by those interested and we were able to continue the work.

Many conditions have been brought to light which will be helpful in extending control measures among grade herds, should such a step ever be undertaken by us.

In testing herds it must be understood that all animals over six months of age are included in the test.

The main point of importance confronting our breeders and our live-stock sanitary board is to prevent the reinfecting of the herds by fresh importations. This at first sight may seem easy of solution, yet many difficulties arise which check the work.

In these difficulties may be counted:

The importation of the generalized case which fails to respond to the test.
The animal tested during the incubative stage.
The diseased animal filled up with tuberculin.
The dishonest breeder substituting cattle.
The dishonest veterinarian passing reactors.

As a rule these factors arise only when breeders purchase from other states. Buying, selling or exchanging pure-bred animals owned within our own state carries very little risk, because all pure-bred herds are tested by veterinarians in state employ and it is seldom the same field veterinarian applies two successive tests to a herd.

The work has resulted in calling our attention to certain conditions under which the test should be applied, also what conditions were favorable or unfavorable in controlling the disease. The conditions under which the test should be applied are:

The test should be made by a state employee.
The entire herd should be tested.
Morning preinjection temperature readings should be taken corresponding to the fourteenth hour after injection.
Animals with normal temperatures only should be injected.
Conditions and environments of herd should be normal.

Favorable conditions in control:

Confidence of the owner in the test.
Prompt removal of reactors.
Thorough disinfection.
The introduction into the herd of tested animals only.
Repeated tests.

Unfavorable conditions are:

Antagonism of the breeder to the test.
Dishonesty.
Retention of reactors in the herd.
Unsanitary buildings.
Lack of proper disinfection.

It has been the policy to test every animal in the herd over six months of age. Where it is found a high percentage prevails, animals under this age are isolated from the non-reactors when possible until old enough to test. In as many cases as possible reactors have been removed for immediate slaughter. We find it a difficult matter to eradicate the disease where reactors are continued on the farm. So many ways are open by which infection may be spread which do not appear to the owner; for instance, five valuable reacting cows were isolated and kept housed in a stable adjoining a pasture in which some yearling tested bulls were allowed to run. The manure was permitted to accumulate at the back of the barn in the pasture to which these young bulls had access, the result being 75 per cent. of the young animals reacted on second test. In view, however, of the fact that the yearling females which were in a pasture separated by a road did not respond on second test or third test, we are justified in concluding the infection of the bulls was through the manure, which was undoubtedly contaminated by some of the five isolated diseased cows.

It has been previously mentioned, the greatest difficulty we have is protecting our breeders from introducing diseased animals. While we have educated many of our larger breeders to the danger of importing the disease, it is astonishing how frequently we find our advice neglected. In many cases the owner has when purchasing been present at the test, yet within six months of arrival within the state the animal responded to our test. This is a condition which will exist until such time as state authorities take charge of breeding cattle in their respective states. It is our custom to send one of our field force into other states with intending purchasers, with the understanding their necessary traveling expenses be paid by the breeder; which we realize shows a want of confidence in others. Experience, however, has taught our breeders its necessity.

The work has brought our attention to several facts, among them being the possibility of animals successfully passing through the ordinary period of test without making the rise of temperature, during the time usually expected, between the eighth to the twentieth hour, and in suspected herds temperatures should be taken beginning at the sixth hour after injection, continuing until the twenty-fourth hour. Again we are of the opinion that the benefit of any doubt should be against a suspicious animal and isolation for a retest in six months should be demanded. It has been found that foreign animals when imported and accompanied with certificates of health have failed to respond to our first and second test, but have on the third test reacted, and post-mortem examination has shown calcareous nodules of one or two groups of glands.

Based on tests and post-mortem examinations made on imported cattle, it is believed that repeated injections of tuberculin tend to calcify small lesions, and that animals bearing small glandular lesions when they have been tuberculin injected a few times may fail to respond to the test, but will some time later show a small reaction. We have in mind one herd in which the reactor uncovered was the herd bull. The mother was imported and while in the herd passed the test and we were at a loss to account for the reaction. Upon a later test this cow gave a slight rise of 1.5°, and was killed. Submaxillary glands were found to be tuberculous.

We have found the disease difficult of eradication in old, unsanitary barns, notwithstanding premises had been properly disinfected under our supervision. One herd we have tested every six months and a case of tuberculosis has been revealed at each test, and while a careful physical examination has been made for diseased non-reactors we have so far failed to find any suspicious animal. I am convinced the barn harbors the infection, notwithstanding disinfection.

In another herd, kept on premises as above, which had passed two negative tests, a reactor was uncovered. Post-mortem revealed a small lesion of the submaxillary.

In herds in which the disease had a firm footing, reactors were found even as late as the fifth test. In this particular case the two reactors were found to have made a rise of almost 2° at first test, reaching 103.2°; but as temperature was apparently sustained no action was taken. Three subsequent tests were given with negative results. On the fifth test both reacted strongly.

Attention is especially directed to the fact that diseased animals may run two, three or more negative tests; hence herds in which the disease exists must be under constant supervision.

The work carried on so far includes 265 pure-bred herds, and numbers 6914 head given the test, averaging about 26 head to each herd.

We have deemed it advisable to group our pure-bred herds into three classes:

Class A. Containing only herds in which tuberculosis was absent on first and second tests. These herds are tested yearly and require only protection from the introduction of diseased animals.

Class B. Includes all herds in which on first test reactors are found. These herds are tested again within six months.

Class C. Is made up of herds in which diseased animals are found and quarantined, or the Bang system inaugurated.

As to Class A, it is obvious if tuberculosis does not exist in the herd and no foreign cattle introduced, there is no danger of tuberculosis.

Herds in Class B are to be promoted to Class A after three successive tests have been made without uncovering diseased animals.

Herds in Class C must be considered as containing the infection, and require special attention on the part of the authorities.

It is natural for owners to become careless with the passing of time, and so many ways are open by which the disease may be spread that constant watchfulness is required. Periodical visits should be made to see that quarantine conditions are being faithfully carried out.

The following table gives the results of the work so far:

Test.	No. tested.	No. reacted.	Per cent.
1st	6914	703	10.16
2d	3281	61	1.85
3d	1535	33	2.14
4th	714	1	0.14
5th	255	2	0.78

265 herds tested, average number in each herd being 26.

On second test 13 animals reacted which had been imported after the first test. On third test 8 animals reacted which had been imported.

Those reacting on fourth and fifth tests were in bad herds. The two reactors on fifth test had made a rise of 2° on first test, but were not isolated and they passed three later tests. Their reaction came as a surprise therefore on the fifth test.

We may be pardoned if we lay great emphasis on the eradication of the disease in a few herds, but we must remember these few herds were in the past the disseminators of the disease. Grade herds play but a very small part in the spread of tuberculosis, hence if the disease is suppressed in pure-bred herds we can say the disease is practically controlled.

All known pure-bred herds in the state have been tuberculin tested with one exception, and a directory giving names and addresses of owners is published annually.

It is true some of our breeders were forced into line by the provisions of a statute which prohibits the sale of pure-bred cattle unless accompanied by a certificate of health issued by the Live-stock Sanitary Board. Any doubt as to the wisdom of the statute has been relieved, and many who were skeptical of this policy of control are convinced the statute is of mutual benefit to buyer and seller and breeders are unanimous in its praise.

Under the statute some twenty-three hundred official certificates have been issued, an average of about two a day.

Blanks are provided breeders, and when sales are made a description of the animal is given and the following form of certificate issued, which is good for one year:

OFFICIAL HEALTH CERTIFICATE

Minnesota State Live-stock Sanitary Board

No.............. Date..

Issued in accordance with Chap. 392, Laws of 1909, prohibiting the sale of pure-bred cattle unless tuberculin tested.

Owner .... Address ....

Name of Animal .... Color ....

Breed .... Age ....

Bureau tuberculin injected. Date.............. hour.............., c.c...............

Temperature before injection

....

m. m. m. m.

Date..

Temperature after injection

....

m. m. m. m. m. m.

Date..

This is to certify that the above is a correct copy of tuberculin test record made and sworn to by..

....

Secretary.

In conclusion it is recommended:

All tuberculin tests of pure-bred herds be under state supervision without expense to owner.

When reactors are uncovered, retests be made every six months until negative results are obtained, then every year.

The Chairman: The time is pretty well advanced, and I think it will be best to defer discussion.

The meeting is now adjourned, so that you may have time to reach the boat and go on the ride down the harbor.

Friday Morning, September 5, 1913

(Dr. Charles H. Higgins, in the Chair)

The Chairman: Yesterday, when we concluded our meeting, two papers presented on tuberculosis by Dr. Haring and Dr. Ward remained to be discussed. Does anybody desire to discuss those papers now? If there is no discussion on those papers, and especially as we are somewhat pressed for time, we will go on with the regular program for this morning. Each man will be held to twenty minutes in which to read his paper. The first paper this morning is, "The Need for Physical Examination in the Diagnosis and Control of Contagious Abortion," by Dr. W. L. Williams.

Dr. Williams: The precise title of my paper as published in the program is somewhat erroneous. I should say, our paper. The title of our paper is "The Need for a Means of Physical Diagnosis of Abortion."

THE NEED FOR A MEANS OF PHYSICAL DIAGNOSIS OF ABORTION

By W. L. Williams, J. N. Frost and R. R. Bolton
Ithaca, N. Y.

The physical diagnosis of disease is primeval and fundamental. For a long time, in the beginning of medical science, the nature of a disease was determined by what the observer could recognize upon a physical examination of the patient. The symptoms of the disease which were thus recognizable gave to almost all diseases the names by which they are characterized today.

Later other means of diagnosis were brought into use. The dead body was examined, either with the naked eye or with the aid of the microscope, of chemistry or other science, and the character of the lesions became more or less known. Anatomical or pathological diagnosis became established, which added much to medical knowledge and served to increase the accuracy in differentiation. In some instances it served to unite as a single disease certain groups of symptoms, as those of consumption, scrofula, etc., to constitute tuberculosis. Anatomo-pathologic diagnosis did not however, as a rule, attempt to supplant the diagnosis of disease by the symptoms presented, but left the original method as the foundation and built upon this a valuable superstructure.

In recent years there has been an enormously important development in our knowledge of the bacteriology of disease. It has been learned that most diseases are due to the presence in the tissues of the patient of living organisms or their products. The advancement in our knowledge of disease through biologic research has been so profound that at times it seems the foundations which were earlier laid have been well-nigh discarded. At the present time investigations in relation to the bacteriology of disease readily take first place in our study of pathology, and the importance of the subject increases year by year.

The diagnosis of disease finally came to rest largely upon three factors:

1. The clinical symptoms, which might be recognized by observing the living patient.

2. The characteristic lesions observed upon post-mortem examination or otherwise.

3. The recognition of the pathogenic organism, its products or the effects of these upon the animal tissues.

Early after the discovery of tuberculin as a diagnostic agent for tuberculosis there was a strong tendency toward the neglect of physical diagnosis and a complete reliance upon the biologic test alone. This led into serious errors, since there were cases of tuberculosis which could readily have been diagnosed by physical examination but escaped detection because of the failure of the tuberculin test. After many failures upon this or other account, some have tended to swing to the opposite extreme, to discard the tuberculin test and return to the fundamental physical diagnosis. In this way on the one hand the diagnostician has discarded the foundation to rely wholly upon the superstructure, and on the other has reversed the process by discarding a highly elaborate and valuable superstructure to return to a neglected and in many respects limited fundamental plan.

A similar experience has occurred in the case of glanders. Some have turned to the mallein test, where the physical diagnosis should have been supreme and any biologic test ignored; that is, in case of thoroughly typical glanders. After relying upon the mallein test for many years and finding that it frequently led the practitioner and the sanitarian astray, especially in cases where physical diagnosis should have sufficed, they have searched for other methods by which the mallein test might be supplanted. The agglutination and complement-fixation tests have been proposed as being safer, if not infallible, and the mallein test has been more or less discredited. It is not strange that, under these circumstances, there are some who, at least for practical purposes, would ignore the biologic test for glanders and return to the primeval method of physical diagnosis, surrounded as it is by many limitations of the most serious character.

We thus find there is a constant tendency to adopt one method of diagnosis to the exclusion of all others, instead of using each and every valuable means at hand.

No disease has been so peculiarly handled from a diagnostic standpoint as has contagious abortion. There has been no general recognition of any basic clinical signs of the disease. The idea of contagious abortion has been largely based upon a single phenomenon, that of the death and expulsion of an immature fetus. Such definition is sadly deficient. The fetus may perish from the infection and not be expelled, or the infection may cause the expulsion of the fetus without causing its death. The diagnosis of contagious abortion has never been made distinct because it is generally believed that a cow may abort from an endless variety of causes. It has consequently occurred that the contagiousness of the disease has been largely predicated upon the volume of abortion. If there was much abortion in a herd, it was contagious; if only a small amount, it was accidental. Just what constitutes a large or small volume in a herd has not and cannot be defined.

The infection may admittedly be present in the uterus or other organs of the pregnant animal and not cause the death or expulsion of the fetus. The Bang organism may exist in the organs of non-pregnant animals and even of males. Hence the diagnosis of contagious abortion by the phenomenon of abortion itself is necessarily erratic and misleading. It is admitted also by various investigators of contagious abortion that other phenomena of importance frequently occur as the result of the infection. Writers generally admit that sterility very frequently follows the disease or accompanies an outbreak in a herd, though they largely fail to recognize the identity of the disease. They regard sterility as a sequel or complication of contagious abortion rather than as a fundamental symptom of the infection. They say also that aborting cows very frequently suffer from retained placenta and metritis, but they fail to state clearly that retained placenta is just as strong evidence of the presence of the infection of contagious abortion as the phenomenon of abortion itself.

With such a vague and misleading basis for the physical diagnosis of the presence of the infection in an animal or in a herd, investigators have largely turned to biologic diagnosis in relation to this malady and have attempted to ignore the possibility of finding a means of physical diagnosis. The vast majority of investigators pay no heed to physical signs of contagious abortion except the phenomenon of abortion itself, and they then try to check the phenomenon of abortion wholly upon biologic test, such as experimental inoculation, bacteriological search, or the tests by agglutination or complement-deviation. The effect of this is that the basic plan of physical diagnosis is essentially excluded and we are asked to rely upon a superstructure without a foundation.

The vast majority of investigators ascribe contagious abortion of cattle to the abortion bacillus, first adequately described by Professor Bang. Prior to the discoveries by Bang, there was a large and quite influential group of investigators who believed that the granular venereal disease of cattle constituted the essential cause of much abortion and sterility. Since the discoveries by Bang, his adherents have constantly increased in numbers, while those who had believed in the granular venereal disease as a cause have rapidly grown less and are now virtually silenced. The few men, among whom Professor Hess may be regarded as standing in the foreground, who claim that the granular venereal disease is a fertile cause of abortion and sterility, deny that there is any relationship between the granular venereal disease and the abortion bacillus of Bang. Professor Hess and his followers rely upon a somewhat definite physical sign of the disease, and the evidence which they submit is purely clinical. It is true that some bacteriologic investigations regarding the cause of the granular venereal disease have been made, but they have been very brief and the conclusions reached may well be accepted with very great doubt. On the other hand, Bang and his adherents have presented almost exclusively laboratory evidence in regard to the cause of the malady. It is true that experiments have been carried out, but any conclusions based upon them have gone back to the laboratory and not to the clinic for their value as evidence. Somewhat naturally the investigations have been made essentially by laboratory men without a wide and intimate clinical experience. In fact, in this country much of the study in relation to contagious abortion in cattle has been carried out by men who have not been trained in veterinary medicine. They are consequently without clinical experience and are dependent upon a technical knowledge of bacteriology for their conclusions.

In contagious abortion we should call to our aid every possible source of information in relation to the diagnosis of the malady. We must find, and define if possible, a basic method of diagnosis founded upon some reasonably uniform and convincing clinical symptom of infection. We must learn the lesions which we may expect to find upon post-mortem examination, and supplement these by all valuable biologic tests. We must not supplant any one line of search by another, but must supplement each method of diagnosis by each of the others.

A few years ago the granular venereal disease was quite generally accepted as a fruitful cause of abortion in continental Europe. The disease had not been publicly recognized in America until in 1909 when we (W) announced its existence in the state of New York.

Since such high European authorities as Friedberger and Frohner, Hutyra and Marek, and others recognized this as a fruitful cause of abortion, the announcement was deemed of some importance.

In 1910 we (W) undertook a somewhat exhaustive study of the distribution of the granular venereal disease in American cattle, under the joint auspices of the United States Department of Agriculture and the New York State Veterinary College. In our investigations we found that the granular venereal disease is essentially universal in American cattle, regardless of breed, location or method of handling. In our unpublished report it is shown that, according to our basis of diagnosis, we recognized the disease in the genital organs of 86 per cent. of the more than 3000 females. In summarizing our conclusions in that report, we have stated:

"1. Abortion in cattle is essentially always the result of a chronic infection within the utero-chorionic space, revealing itself postmortem by the presence of the so-called abortion exudate, which contains generally, if not always, the abortion bacilli.

2. The granular venereal disease of cattle is, so far as known, universally distributed. It has, by clinical observation, a vital relation to contagious abortion."

Subsequent to the investigations upon which that report was based, we have undertaken further studies, largely upon the possibility of a relationship between the granular venereal disease and the abortion bacillus of Bang. It was suspected that if any important relationship existed between abortion and the granular venereal disease it might be revealed by the agglutination and complement-deviation tests. If, as has appeared to many observers, abortion, sterility, retained afterbirth, etc., are most common in herds where the granular venereal disease is most intense and there is a relationship between them, then it might be that the abortion agglutination and complement-fixation test would be influenced by the intensity of the granular venereal disease.

Since the granular venereal disease is essentially universal, except in very young calves, and the intensity of the disease by visual inspection of the vulva varies in every possible degree, it would naturally be expected, in case it influenced the agglutination and complement-fixation abortion tests, that every possible degree of reaction should occur. There might be no prominent line of demarcation between those heifer calves in the vulva of which no granules could be seen and those in which one, two or several granules were visible. Nor could we expect any notably distinct line of cleavage between the very mild, the moderate and the severe cases.

In a measure there is in all diseases, by whatever method of diagnosis, an area of uncertainty, a twilight zone, when the disease may fail of recognition. In the earliest stages of glanders and mildest infection the changes in the blood may be so slight that the infection may not be recognized clearly by any diagnostic means, though one or more of them may arouse suspicion. Similar confusion may arise when the infection has been largely overcome and recovery is threatened. But in glanders only a small percentage of cases fall within the twilight zone, and these tend to remain static for but a brief time, until they become definitely positive or negative. The area of the twilight zone is largely dependent upon the chronicity of the malady. The greater the chronicity the broader and less distinct the twilight zone. Accordingly such a typically chronic malady as the granular venereal disease, essentially universal and infecting most calves when a few weeks old and persisting throughout life, the gradations between the non-infected and the varying degrees of infection would necessarily be extraordinarily gradual, to which any related biologic reaction should correspond. If at any point an abrupt line of demarcation should occur, it should mark some unusual intensification or repression of the malady.

If the granular venereal disease is truly venereal, copulation should, as it does, intensify the infection, and if there be a relationship between the granular venereal disease and the abortion bacillus, the intensification of the granular venereal disease by copulation should be revealed in increased reaction to the agglutination and complement-deviation tests.

Similarly it has been suggested that there is a clinical relationship between abortion and the white scours of calves. If such relationship be intimate, the blood from calves having white scours might reveal that relationship by reaction to the abortion agglutination and complement-fixation tests.

Some fragmentary investigations have been undertaken by us in an attempt to determine if there is any relationship between the intensity of the granular venereal disease and the reaction of the blood by the agglutination and complement-fixation tests with abortion bacilli. The agglutination tests at the college have been made by Drs. Fitch and Bolton. In order to render these tests dependable by verification we enlisted the coöperation of Dr. John R. Mohler, who has made an extensive series of tests by agglutination and complement-fixation. The writers desire to gratefully acknowledge the very valuable assistance rendered to us by Drs. Mohler and Fitch.

The agglutination and the complement-fixation tests of Dr. Mohler agreed throughout with each other, and these tests corresponded perfectly with the simultaneous agglutination tests by Drs. Fitch and Bolton. Our own tests being the more extensive we are using these alone.

1. Second test, twenty-one days later, + at 1 to 100.
   Third test, nine days later, + at 1 to 25.
   Fourth test, one hundred and forty-six days after first test, − at 1 to 10.
2. Bred June 27, one hundred and eleven days after test, thirty-six days after breeding granular venereal disease distinct, reaction slight at 1 to 100.
3. Bred April 12. Fed abortion cultures June 3 and 25 and July 11. Tested at 1 to 10 on July 27 and August 1.
4. Bred January 27.
   Test April 8 + at 1 to 600.
   Tests June 2, 6 and 7 + at 1 to 50.
   Fed abortion cultures June 3 and 25 and July 11.
   Tests June 8 and 9 + at 1 to 25.
   Tests June 10 and 11 + at 1 to 50.
   Tests June 12, 13, 14, 16, 20, 26, 27 and 30; July 2, 5, 8, 27.
   August 1 and 4 + at 1 to 600.
   Aborted August 4.

Autopsy. Abortion exudate abundant, abortion bacilli not found by smears or cultures.

5. One hundred and forty-six days later had developed granular venereal disease and tested + at 1 to 100.
6. One hundred and forty-six days later had developed granular venereal disease and tested + at 1 to 100.
7. Sterile from arrested genital development. Granular venereal disease very bad. Killed and no second test made.
8. Premature birth four days previously.
   Second test twelve days after premature birth + at 1 to 10.
9. Bred June 13, July 19 and 26.
   April 8 + at 1 to 10.
   August 1 and 4 + at 1 − 600.
10. One hundred and forty-six days later tested − at 1 to 10.
11. One hundred and forty-six days later granular venereal disease increased and tested + at 1 to 100.
12. Bred a few days before.
13. Aborted. Retest thirteen days later (two weeks after abortion) + at 1 to 600.

14. Sterile. Chronic endometritis, cystic degeneration of ovaries.
15. Calved and had metritis forty-eight days before test.
16. Pregnant.
17. Abortion and metritis forty-six days previously.
18. One hundred and forty-six days later + at 1 to 10.
19. One hundred and forty-six days later tested – at 1 to 10.
20. Abortion and metritis twenty-nine days previously.
21. Abortion and metritis thirty-one days previously.
22. Abortion and metritis six months previously.

CHART I

NO.	AGE.	GRANULAR VENEREAL DISEASE	1–10		1–25	1–50	1–100	1–200	1–600
3	AGED.	+	– (1)						
52	327 DAYS.	S	– (2)						
40	1 YEAR.	S	– (3)						
78	18 MO.	S	– (4)						
71	180 DAYS.	–	–						
73	152 DAYS	–	– (5)						
74	135 DAYS.	S	– (6)						
25	2 YEARS.	+	– (7)						
2	2 YEARS.	+	– (8)						
50	18 MO	S		S ([illegible])					
75	68 DAYS	+		+ (10)					
2	2 YEARS.	+		+ (8)					
61	1 YEAR	+		+	+ (11)				
4	18 MO.	S		+	+ (12)				
1	2 YEARS	+		+	+	+ (13)			
0	10 YEARS	+		+	+	+ (14)			
65	AGED.	+		+	+	+	+ (15)		
63	AGED	+		+	+	+	+ (16)		
3	AGED	+		+	+	+	+ (1)		
64	AGED	+		+	+	+	+	+ (17)	
70	3 YEARS.	+		+	+	+	+	+	
76	18 MO.	B		+	+	+	+	+ (18)	
51	334 DAYS.	+		+	+	+	+	+ (19)	
58	3 YEARS	+		+	+	+	+	+	+
28	4 YEARS	+		+	+	+	+	+	+
62	AGED	+		+	+	+	+	+	+ (20)
66	AGED	+		+	+	+	+	+	+ (21)
67	AGED	+		+	+	+	+	+	+
1	2 YEARS	+		+	+	+	+	+	+ (19)
29	AGED	+		+	+	+	+	+	+ (22)

In column 3, – = no visible elevations in the vulvar mucosa; *S* = slight granular venereal disease, approximately five or six to fifty visible elevations in the mucosa, without irritation or discharge; + = well-marked vulvar lesions of fifty to hundreds of nodules in the vulvar mucosa, with or without appreciable irritation or discharge; *B* = bull.

A study of Chart I shows a gradual increase in the reaction of the blood to the agglutination test, without showing a twilight zone. The animals constitute a thoroughly mixed group of all ages, some have aborted, others have suffered from retained afterbirth, from sterility, etc., while others have clean breeding records. It would be quite impossible to determine from this and the succeeding charts at what point to draw the line between reactors and non-reactors. It is to be noted that of the 11 animals (No. 2 repeated) in the 1 to 10 column most of them are heifer calves or virgin heifers. No. 3 in subsequent tests shows a vacillating agglutination reaction up to 1 to 100. No. 2 gave a premature birth and was followed for but twelve days. No. 25 was tested but once.

Numbers 48, 49, and 50 had received occasional antiseptic vaginal douches which had repressed the granular venereal disease in the vulva, so that they present low reactions as compared with most animals of their ages.

In a second test, one hundred and forty-six days later, Nos. 52, 73, 74 and 61 had developed more intense granular venereal disease and tested positive at 1 to 100; No 75 had changed from + to − at 1 to 10 and No. 51 had shifted from + at 1 to 200 to − at 1 to 10.

In recording the intensity of the granular venereal disease our system is not well matured. As we (W) have indicated in our unpublished report the granular venereal disease is generally recognizable in heifer calves four to six weeks old by the existence in the vulvar mucosa of several or few nodules or granules. The malady tends to remain mild or dormant until after the first coition, when it becomes abruptly intensified and quickly reaches its zenith. A study of the chart shows that most of the strong reactors have copulated and that the negative or low reactors are mostly virgin heifers or, like No. 48, 49 and 50, have been subjected to handling which has repressed, but not cured, the granular venereal disease.

In Chart II we have the agglutination test of a herd of pedigreed dairy cattle consisting almost wholly of aged cows and heifer calves. Of the 13 heifer calves and virgin heifers 6 tested within the 1 to 10 column, 3 were + at 1 to 25, 2 at 1 to 50 and one each at 1 to 100 and 1 to 200.

The granular venereal disease was quite well marked in all the heifer calves except in No. 19. It was marked "slight" in the two aged cows, No. 9 and 13, but in such animals the vulvar lesions are often masked and the gradation is of little interest.

In Chart III we record blood tests in a stable of 26 calves ranging between eight and two hundred and sixty-six days old. 10 heifer calves and 1 bull calf tested, at 1 to 10. Only 1 of the 10 showed marked vulvar lesions and in this case they were not severe. 6 heifer and 2 bull calves tested positive at 1 to 10 and the signs of the granular venereal disease were correspondingly mild. Our designation of the extent of the vulvar lesions were more detailed than in Charts I and II. If but 1 to 3 granules could be seen in the vulvar mucosa, it was designated as a "trace"(*T*); when 5 to 10 or more granules were present and well developed it was designated "slight" (*S*), while in those marked +, 15 to 50 or more granules were visible and prominent.

CHART II

NO.	AGE.	GRANULAR VENEREAL DISEASE	1—10		1—25	1—50	1—100	1—200	1-600
23	139 DAYS.	+	—						
15	3 YEARS.	B		+					
19	173 DAYS.	S		+					
20	133 "	+		+					
21	126 "	+		+					
22	133 "	+		+					
35	9½ MO.	+		+					
5	AGED.	+ +		+	+				
6	"	+		+	+				
8	"	+ +		+	+				
9	"	S		+	+				
10	"	+		+	+				
14	2 YEARS.	B		+	+				
16	104 DAYS	+		+	+				
26	185 "	++		+	+				
32	14 MO.	+		+	+				
18	114 DAYS	+		+	+	+			
30	160 "	+		+	+	+			
7	AGED.	+		+	+	+	+		
13	"	S		+	+	+	+		
33	10½ MO.	+ +		+	+	+	+		
27	187 DAYS.	+		+	+	+	+	+	
11	AGED	+		+	+	+	+	+	+
12	"	+		+	+	+	+	+	+

CHART III

NO.	AGE.	GRANULAR VENEREAL DISEASE	WHITE SCOURS	1—10		1—25	1—50	1—100	1—200	1—600
1	8 DAYS.	T		—						
2	52 "	S	+	—						
4	36 "	T		—						
11	90 "	+		—						
13	102 "	T	+	—						
14	118 "	T		—						
15	117 "	+		—						
16	57 "	B		—						
20	199 "	S	+	—						
21	62 "	S		—						
25	204 "	S		—						
3	120 "	B	+		+					
5	28 "	—			+					
7	71 "	B			+					
9	80 "	+			+					
19	110 "	T			+					
22	130 "	+			+					
23	197 "	+			+					
24	205 "	S			+					
10	211 "	+			+	+				
12	211 "	+			+	+				
26	266 "	[illegible]			+	+	+			
18	201 "	B			+	+	+	+		
17	47 "	B	+		+	+	+	+	+	
6	13 "	B	+		+	+	+	+	+	+
[illegible]	108 "	+	+		+	+	+	+	+	+

The prior charts suggest that the agglutination reaction is largely dependent upon the age of the calf, and in a way there is some truth in it, but here we have evidence that it is not directly the result of age. The average age of the 26 calves is one hundred and fifteen days, while that of the three highest reactors is fifty-six, or less than one-half the average of the stable.

Numerous clinicians have observed that in herds where abortion prevails white scours is frequent and severe, so much so that an intimate relationship or possible identity has been suggested. It is notable in this connection that the three strongest reactors had all suffered severely from white scours; 2 of them being bulls no effort was made to record the intensity of the granular venereal disease, while in the heifer it was well marked. In the 3 other heifer calves which had suffered from white scours they had long before recovered and the granular venereal disease was a mere trace or slight.

In our investigations we have found that we can, by visual examination of the vulva of heifer calves and virgin heifers, state with fair precision whether their blood will react to the agglutination and complement-fixation test for abortion and to what degree. Thus far there has been a small margin of error which has been less than the vacillating character of the granular venereal disease. The errors are of two classes: Animals showing very slight or no vulvar lesions may react strongly, and others having severe lesions react slightly or not at all. In those cases which react strongly, with but slight or no vulvar lesions visible to the eye, the infection may exist in other parts, such as the uterus or the intestinal tract (white scours), or they may be present in the vulvar mucosa and masked by œdema of infiltration. In the second group, where the blood tests are negative or low in the presence of intense granular venereal disease, the phenomenon is perhaps analogous to the failures of the biologic tests in glanders and tuberculosis in certain very advanced cases. Such errors are even more common in relation to the abortion tests for abortion itself. In our observations the blood of a very large proportion of cows which abort reacts slightly or not at all when tested near to the abortion. The same appears true of apparently normal birth.

In Chart IV the blood of Nos. 31, 34, 48, 2 and 1 was tested within eight days before or after abortion or parturition, and in but one of these was there a strong reaction; but as soon as we depart fifteen to twenty days from the date of the expulsion of the fetus the reaction uniformly becomes marked. The harmony between the intensity of the granular venereal disease in heifer calves and the reaction of their blood to the abortion tests has been immeasurably greater than the correspondence observed between the blood tests of aborters and the act of abortion itself.

The death and expulsion of the immature fetus from the uterus is merely *one* phenomenon of the infection of abortion and there are probably other crises in the history of the infection in which the intensity of the reaction is depressed or destroyed.

Chart IV

NO.	SOURCE	1–10	1–25	1–50	1–100	1–200	1–600
31	ANNUAL REP. N.Y. STATE VET. COL. 1912. P. 104.			164 − 6 + 0 −	26 +	79 +	144 +
34	"	1 − − 8					245 + + 33
48	CHART I.		56 +	58 + 54 +			118 + 52 + 4 + 0 +
2	"	− 4 + 12					
1	"			+ 1			+ 13
64	"					+ 46	
62	"						+ 20
66	"						+ 31
20	"						+ 32 + 180

In our above-mentioned unpublished report we (W) have recorded our observation that the amount of abortion in a herd is in harmony with the intensity of the granular venereal disease. We may now add that the reaction of the blood of cattle to the abortion tests is also in harmony with the intensity of the granular venereal disease.

These brief and fragmentary data are submitted without conclusions except that they seem to us to warrant further effort to find some dependable means for the clinical recognition of the presence of the infection of contagious abortion which shall afford aid and add to the accuracy of diagnostic methods now in use.

The Chairman: We are to have other papers on this subject, and perhaps it would be better to have the papers first and to take the discussion afterward. The next paper on the program is "Pure Milk Production and the Abortion Bacillus," by Dr. E. C. Schroeder, of Washington, D. C.

PURE MILK PRODUCTION AND THE ABORTION BACILLUS

By E. C. Schroeder
Bethesda, Md.

The dangers incident to the use of raw milk remain too commonly undervalued, notwithstanding that available evidence proves that it is impossible to produce milk under the most favorable, economically obtainable conditions unfailingly free from pathogenic contaminations, or free even (a matter of primary importance to veterinarians) from those agents of disease that propagate within and emanate from the bodies of dairy animals. Too many physicians and, under their influence and guidance, too many other persons, on the basis of hypothetical objections, remain averse to the use of heat to neutralize dangers that may be hidden in raw milk of seemingly the best quality, or perfect milk according to all tests that can be applied to it before it is too old for use. Such dangers are unsuspected until they are revealed too late by the harm they have done so often that it is difficult to convince those who have escaped them that they are real and serious and not rarely fatal, or that an article of food, in itself harmless, wholesome, nutritious and practically indispensable, repeatedly serves as a medium for the multiplication and dissemination of virulent disease germs, and that it is one of the commoner sources to which epidemics are traced with unquestionable certainty. And, unfortunately, much of the harm done by the use of raw, contaminated milk is so insidious in its development that a true conception of the magnitude of raw milk dangers is often defeated by the fact that most of us can point to instances in which inferior, stale and bacteria-laden milk has been consumed in large quantities without doing harm that is traceable to it.

Hence the object of this short paper is less to define one of the more recently discovered dangers that needs mature consideration in all attempts to produce pure milk, than to make a new appeal to good, sound sense against the use of milk in its raw state, by presenting an addition to the ever-increasing, irrefutable evidence that supports the conclusion, almost unanimously indorsed by sanitarians who have studied the milk question, that all milk should be made truly safe by pasteurizing, scalding or boiling it before it is used as food.

The bacillus of infectious abortion of cattle is an extraordinary organism; it is capable of affecting widely different species of animals; the lesions it causes in some species are wholly unlike those it causes in others; it has the faculty of maintaining itself long periods of time in living animal tissues without causing macroscopically discoverable lesions; it may live weeks and months in the living tissues of such widely different animals as monkeys, pigeons, rabbits, rats, mice, guinea-pigs and cattle;[1] it may occur in the milk of cows months before it causes them to abort; it has been found in the milk of cows that have not aborted and which afterward, without aborting, while the bacillus continued to occur in their milk, produced a succession of healthy calves at full term, and many cows that are invaded by it, if not most, as indicated by tests at the experiment station, become chronic carriers of it and continue to expel it from their udders with their milk indefinitely. In several cases, under continued observation, repeated tests proved that it remained as a contamination in the milk of infected cows two, three and longer than four years.

The long persistence of the bacillus in the tissues of animals has a parallel in the continued persistence of tubercle bacilli in the tissues of even those animals for which they are not truly pathogenic, but in one respect it is a wholly different phenomenon. Tubercle bacilli persist in localized, usually encapsuled lesions, which soon lose the character of living tissues, while the abortion bacillus is diffused throughout one or more organs in which frequently no lesions can be discovered. Whether it multiplies during its residence in such organs, as it certainly must in the udders of infected cows, or whether it is simply stored in them until it is slowly and gradually destroyed, remains an unanswered question.

Another unanswered question is whether it actually injures human health. In the report of the British committee appointed by the Board of Agriculture and Fisheries to inquire into epizoötic abortion, the following significant statement is made:[2]

"Although it is hardly germane to the present inquiry, we think it advisable to point out that, since the bacillus of infectious abortion of cattle is pathogenic for so many species, the possibility of the human female being infected should not be lost sight of."

This statement was made before it became known that the bacillus is of common occurrence in the milk of cows, or that it occurs in milk at all, and hence before it was known that human health is repeatedly and directly exposed to it through the use of raw milk and other dairy products derived from raw milk.

Dr. Theobald Smith,[3] whose judgment we should know how to value, in an article on the abortion bacillus, by himself and Marshall Fabyan, called attention to the possibility that it may cause disease in persons, and, only recently, at the last annual meeting of the American Association of Medical Milk Commissions Larson and Sedgwick of Minnesota reported that they have made 425 complement-deviation tests with the blood of children, in which the abortion bacillus was used as the antigen and that they had obtained 72 or 73 positive reactions. The claim was made in connection with these tests that the proportion of reactions would have been greater had the tests been confined to children fed on raw cow's milk, and this claim we can readily credit when we know that the abortion bacillus is capable of maintaining itself for many weeks in such dissimilar environments as the living tissues of monkeys, pigeons, various rodents and cattle.

Most bacteria that gain entrance to the living tissues of animals for which they are not pathogenic disappear quite rapidly, and bacteria also disappear quite rapidly from the living tissues of animals for which they are virulent after immunity against them has developed. In this respect the long-continued persistence of the bacillus of infectious abortion in the living tissues of different species of animals may be looked upon as a significantly important form of parasitism to which human bodies should not be subjected.

We may say, relative to the bacteria against which human health should be guarded, that it is questionable whether repeated exposure to a bacterium pathogenic for any species of mammals can be practised with impunity; that it is dangerous to permit repeated exposure to any bacterium that is pathogenic for several species of mammals, though it may be, so far as we are informed, harmless for human beings, and that it is a deliberate invitation to disease to permit repeated exposure to a bacterium, like the abortion bacillus, that is pathogenic for widely different species of mammals and is known to cause changes in human bodies that can be detected by complement deviation or other biochemic tests or tests of any kind.

And now, as the importance of a menace to public health depends largely on the frequency with which exposure to it occurs, let us examine the available data on the occurrence of the abortion bacillus in the commercial milk supply:

During the years 1893 and 1894 I made a number of tests under the direction of Dr. Theobald Smith, who was then in charge of the Division of Pathology of the U. S. Bureau of Animal Industry, on the occurrence of tubercle bacilli in the milk supply of Washington, D. C. Among the guinea-pigs injected with milk one showed lesions on post-mortem examination closely resembling tuberculosis, but in which no tubercle bacilli could be found. Dr. Smith studied the lesions and, in a footnote to my report on the milk tests, described them with so much precision and clearness that no one informed on the subject can read his description now without recognizing that they were the characteristic, almost unmistakable lesions caused in guinea-pigs, as we have since learned, by the bacillus of infectious abortion of cattle.[4] Subsequently, abortion disease was not again found in guinea-pigs injected with milk, or if found was insufficiently described for recognition, until the year 1907, when a number of guinea-pigs injected at the Experiment Station with samples of milk from the Washington supply showed lesions easily mistaken for tuberculosis but in which tubercle bacilli could not be found after prolonged search. The failure to find such lesions between 1894 and 1907 can possibly be explained by the small number of milk tests with guinea-pigs made during this interval of about twelve years, as abortion disease in milk-injected guinea-pigs has been far from uncommon at the Experiment Station during the last six years.

The disease in the guinea-pigs was soon proved to be transmissible from guinea-pig to guinea-pig through the inoculation of small fragments of affected organs, and its cause was traced through guinea-pig injections to its source in the udders of seemingly healthy cows. Beyond this it remained a puzzle until the year 1910, in which improved facilities for bacteriological investigations at the Station enabled Cotton and myself to isolate a bacillus from affected guinea-pigs and to prove it to be the true cause of the disease. The bacillus, at first believed to be a previously undescribed organism, was the subject of two papers in 1911, one presented to the American Association of Medical Milk Commissions[5] and the other to this Association,[6] and was definitely identified in 1912 as the bacillus of infectious abortion of cattle.[7]

Without entering into lengthy details about Experiment Station milk tests, made under my supervision by Doctors Cotton and Brett of the Station, the factors brought out, pertinent to the subject under consideration, are the frequency of the bacillus of infectious abortion, as shown by guinea-pig injections, in all samples of milk tested from 1907 to 1912 inclusive; the relative frequency of contamination, respectively, in 1907 and 1912, and the frequency with which the milk of individual dairies is contaminated.

From 1907 to 1912 inclusive, 516 samples of milk from 90 different dairies were injected into 1068 guinea-pigs. Among the guinea-pigs, 237 died prematurely from intercurrent affections, and among the remaining 831 abortion disease was found on post-mortem examination in 103, or over 12 per cent. The infected milk was obtained from 29 different dairies showing that nearly one-third of the dairies included in the tests from time to time distributed milk contaminated with living abortion bacilli. The same tests yielded ten cases of tuberculosis, which were chargeable to the milk of seven different dairies.

Some of the milk tested was sold as pasteurized; in two samples of this living abortion bacilli, and in one sample living tubercle bacilli, were found, proving that commercial, unsupervised pasteurization is not reliable. And some of the milk was sold as "special milk," probably "special for infant feeding," and this caused two cases of abortion disease, proving that the name "special" is no guarantee against living disease germs in milk.

That commercially pasteurized milk, pasteurized without satisfactory official supervision, at times causes abortion disease and tuberculosis in guinea-pigs injected with it, should not be construed as a charge against the efficiency of pasteurization to check milk dangers due to living pathogenic agents. At the Experiment Station many hundreds of guinea-pigs have been injected with milk known to contain either or both abortion and tubercle bacilli, some with portions of the milk in its raw state and others with portions of the same milk, obtained at the same time, from the same sources, in the same containers, after it had been pasteurized by station employees at 60° C. (140° F.), maintained for twenty minutes. In no instance among these hundreds of guinea-pigs was either tuberculosis or abortion disease caused by the injection of the pasteurized milk, while nearly all of the guinea-pigs injected with this infected milk in its raw state contracted either or both abortion disease and tuberculosis.

In the year 1907, thirty-six samples of milk from 32 different dairies were injected into 72 guinea-pigs. Among the guinea-pigs 9 died prematurely from intercurrent affections, and among the remaining 63 abortion disease was found on post-mortem examination in 8, or over 12½ per cent. The infected milk was obtained from 5 different dairies, or over 15 per cent. of those included in the tests. The tests yielded 3 cases of tuberculosis, which were chargeable to the milk of two different dairies.

In the year 1912, 77 samples of milk from 40 different dairies were injected into 154 guinea-pigs. Among the guinea-pigs 69 died prematurely from intercurrent affections[8] and among the remaining 85 abortion disease was found on post-mortem examination in 26, or over 30 per cent. The infected milk was obtained from 15 different dairies, or 37½ per cent. of those included in the tests. The tests yielded 2 cases of tuberculosis, which were chargeable to the milk of two different dairies.

A number of tests on six, eight, ten or more consecutive days were made with milk from several large dairies, and these proved that most distributing dairies that sell milk collected from a number of different farms can be shown, if a sufficient number of tests are made, to be vending milk that is intermittently contaminated with abortion bacilli.

We may tabulate the results of the tests as follows: Six-year period, 1907 to 1912 inclusive, 30 per cent. of all dairies tested more or less seriously infected with abortion disease. One year, 1907, 15 per cent. of all dairies tested infected. One year, 1912, 37½ per cent. of all dairies tested infected. The force of this evidence is strengthened by the fact that a sufficient number of tests with the milk of almost any large distributing dairy will sooner or later reveal abortion disease.

No one, it seems, can contemplate the facts without realizing that the frequency of abortion disease among dairy cattle is increasing at an alarming rate. Possibly the conditions among cattle elsewhere are not as serious as in the environment of the District of Columbia, at least, it is sincerely hoped that this is the case; but whether it is or no, the great frequency with which the abortion bacillus occurs in the commercial milk supply of Washington, and the increasing frequency with which milk is infected with this remarkable organism, which seems to belong in a class by itself, should convince us that milk pure enough for use in the raw state cannot be produced anywhere.

The difficulties attending the production of milk free from the abortion bacillus are well illustrated by an investigation at the Experiment Station on the relative value of raw, pasteurized and boiled cow's milk as a food for young animals. In the investigation 467 guinea pigs were fed artificially on cow's milk from birth until they were weaned. One-third of the young animals received raw milk. Though unusual care was taken by men who are well informed on the nature and sources of milk contaminations to obtain milk of the purest kind for the investigation, from Station cows that were under constant supervision, it was found before the investigation, which extended over several years, was concluded, that some of the guinea-pigs which were fed raw milk had become infected with abortion disease. It may be well to add that it is not difficult to infect guinea-pigs with abortion disease by feeding them milk that contains the abortion bacillus, and that the investigation proved that boiled cow's milk from every point of view is a more satisfactory food for young guinea-pigs than raw cow's milk.

I am convinced, if we had no other contamination in milk to deal with than the abortion bacillus, and it is only one of many dangers, some of which are more definitely known to attack human health, it would be amply sufficient to justify the conclusion that it is imperatively necessary to resort to heat as a simple and inexpensive expedient to make all milk safe before it is used as food.

But we should not permit the availability of so simple and economical an expedient as heat to lead to a relaxation of those precautions that insure the cleanliness, freshness and general excellence of milk, because carelessness, lack of cleanliness, the retention of diseased animals in dairy herds, etc., engender milk dangers that cannot be corrected by heat.

What we should strive for is the cleanest and best, the freshest and purest milk that can be produced, made safe by its exposure to heat under competent, reliable, official supervision.

References

1. Marshall Fabyan. Jour. Med. Research, vol. xxxviii, No. 1.
2. Report of English Committee, Part I, page 15, London, 1905.
3. Theobald Smith and Marshall Fabyan. Centralblatt für Parasitenkunde und Infectionskrankheiten, vol. lxi, No. 7.
4. E. C. Schroeder. Bureau of Animal Industry, Bulletin No. 7.

5. Proceedings of the American Association of Medical Milk Commissions for the year 1911.

6. Proc. Amer. Vet. Med. Assoc., 1911, also American Veterinary Review, November 11, 1911.

7. Bureau of Animal Industry, Circular No. 198.

8. The high mortality from intercurrent affections during the year 1912 was largely due to the milk of one or two dairies, from which samples were secured and injected into guinea-pigs on a number of different days and which almost invariably caused acute, rapidly fatal peritonitis.

The Chairman: The next paper on the program is "The Persistence of the Bacillus of Infectious Abortion in the Tissues of Animals," by Dr. Wm. E. Cotton, of Washington, D. C.

THE PERSISTENCE OF THE BACILLUS OF INFECTIOUS ABORTION IN THE TISSUES OF ANIMALS

By W. E. Cotton
Bethesda, Md.

It is the purpose of this paper to show that infectious abortion of cattle is one of those diseases in which a very large proportion of the cows, at least those infected with the strains of the disease with which we have worked, harbor the abortion bacillus for a very long time and eliminate it more or less continuously with their milk, without showing visible lesions in the udder, for months and years after the active manifestations of the disease have subsided. In some instances the bacillus of abortion is eliminated by animals in which active disease has not asserted itself at all. Something will also be said as to the length of time the organism remains in the uterus after abortion, and also as to its persistence in the tissues of small experiment animals.

The work from which the data was obtained, was done at the Experiment Station of the Federal Bureau of Animal Industry, at Bethesda, Md., under the direction of Dr. E. C. Schroeder, superintendent, to whose guidance and help I am greatly indebted both in making the observations and in preparing the data presented.

At the Forty-eighth Annual Meeting of this Association, Dr. Schroeder and I presented a paper[1] in which we described an organism that we had found to be eliminated with the milk of a considerable number of apparently healthy cows; that it was of common occurrence in market milk, and that it produced lesions in guinea-pigs which somewhat resembled those produced by the tubercle bacillus. At that time we had failed to identify the organism, which we now know to be that of infectious abortion.

To gain some information as to the constancy with which aborting cows eliminate this organism with their milk and the length of time they persist in doing so, as well as that during which the genital tract remains infected after an abortion, careful watch was kept over all the cows at the Experiment Station, infectious abortion being present among them and slowly infecting the entire herd.

The presence of the abortion bacillus in milk, as well as in other materials, was determined by the inoculation of guinea-pigs, in which, as we have pointed out, it produces characteristic lesions. We have also made cultures from many of the guinea-pigs showing these lesions and recovered the bacillus from them. In making tests with guinea-pigs, two were inoculated in each instance. In making the milk tests, each guinea-pig received from four to six cubic centimeters of whole milk intra-abdominally; in tests of other material the inoculations were usually made subcutaneously. It should be said of the guinea-pigs used in making these tests, as well for all those used for any purpose at the Experiment Station, that of the several thousand that we have autopsied since this investigation has been in progress we have yet to find lesions of abortion disease in a single guinea-pig in which we had not a right to expect to find it. The work is thoroughly checked up, by very many tests of milk and other material, in which guinea-pigs were used, both in this and in other investigations.

The reproductive organs of a bull that had been used to serve some of the aborting cows, and the testicles of two bull calves, one of which had been fed and the other injected with cultures of the abortion bacillus, were tested for the presence of this bacillus but it was not found to be present in any of them, though portions of practically all of the reproductive organs of the adult bull were used in making the tests. We were led to make the above tests because a large proportion of male guinea-pigs infected with abortion bacilli develop grave lesions of the testicles and epididymides, and we have found that these males infect females with which they copulate. We also found the lesions to be present in the epididymis of a rabbit that had received an intravenous injection of the abortion bacillus a number of weeks previously. We thought it possible that the organism might remain in the testicles and epididymides of the male bovine animals without producing visible lesions, as it does in the udder of the female. So far as our investigations have gone it seems that the bull does not harbor the bacillus in this manner, but they have not yet progressed far enough to be conclusive.

In our milk tests, we found that of the cows at the Experiment Station 19 have records of having aborted, of having eliminated the bacillus with their milk, or both. It will be necessary to give the records of a few of these in detail because of some peculiar conditions in each and in order to show the regularity with which the organism is eliminated from some animals.

Cow 637 is perhaps of the greatest interest, since it was she in which we first demonstrated that the bacillus was eliminated from the udder, and hence we have a longer record of her than of the other animals. She was purchased from the Maryland State Experiment Station, and according to its records aborted on September 21, 1907, in the seventh month of pregnancy. She has aborted once since she has been at Bethesda, on July 25, 1911, in the fifth month of pregnancy, the abortion bacillus being found in the fetus.

The first test of her milk, made on February 20, 1909, was positive. Later tests were made as follows: 9 in 1909, 4 in 1910, 14 in 1911, 13 in 1912, and 3 in 1913; 44 including the first. With the exception of 2, made two and three months after abortion, all were positive. She has thus eliminated the abortion bacillus almost continuously for at least four and one-fourth years; and if counted from the time she is reported by the Maryland State Experiment Station to have aborted, which, judging by our experience with other cows, is the probable time at which the milk became infected, would make five years and eight months as the probable time that the organism has persisted in her udder. Her milk when last tested was just as virulent for guinea-pigs as it ever was, and we have no reason to believe but that the bacillus will persist in her udder permanently.

She produced a calf fifteen months after the last abortion occurred; tests made of the placenta showed that the bacillus was absent.

A remarkable fact in connection with this cow, as well as with all cows that carry the abortion bacillus in their udders and yet abort a second time, is that the bacillus in the udder did not induce the production of sufficient antibodies to prevent the invasion of the uterus and consequent abortion. It is possible that abortion may have been caused by infection with another strain more virulent than the one in her udder, but this idea does not seem to be in harmony with the laws of immunity. An attenuated strain of an organism ought to induce some immunity against a more virulent one, and besides, in this instance, as nearly as we could determine by cultural methods and guinea-pig tests, the organism from the udder and that from the fetus were identical.

Cow 479 is also of interest in this connection, since she has aborted twice, and because of the appearance of the abortion bacillus in the placenta discharged at a normal parturition, the third such since the last abortion, four years and five months after the abortion occurred. This seems to indicate that abortion bacilli sometimes appear in the uterus years after an abortion, but either because of the lateness of their appearance or the high resistance of the organ are prevented from damaging the placenta to such a degree as to cause abortion.

We have tested the placentæ of two other cows, each passed at the termination of the normal pregnancy following an abortion, and that from a normal birth in a cow that never aborted, but which harbored the abortion bacillus in her udder, all with negative results. Just how frequently the condition observed in cow 479 occurs I am unable to say; but from the fact that one such case was found out of four animals tested, would indicate that it is not uncommon, and hence it follows, if aborting cows are permitted to enter healthy herds, that the discharges from the uterus following a subsequent normal parturition must be regarded with suspicion.

While the condition found in this cow may be attributed to a new infection, it seems much more probable that it was due to the migration of the bacillus from the udder to the active uterus. We have found the supramammary glands of cows to be infected, showing that the bacilli were travelling toward the blood stream, and once in that, it is not difficult to conceive of them reaching the pregnant uterus, where, finding a favorable soil in the embryonic tissue which it contains, they multiply and set up disease. In some respects the abortion bacillus behaves much like the tubercle bacillus, which may remain latent at some point in the body until conditions arise that make it possible for it to migrate from the original focus to some organ, the resistance of which is below normal, and set up disease. The abortion bacillus, so far as we know, is able to develop only in the pregnant uterus and the udder; the former being the seat of its greater activity, comparable to the weakened organ in tuberculosis, and the udder the seat of the latent focus from which it is infected.

Tests of this cow's milk showed it to be infected when first tested, November 21, 1910, and that it was still infected May, 1913, twenty-nine months later. Sixteen tests made in 1912, and three in 1913, showed the bacillus to be present in all but two. She has therefore eliminated the abortion bacillus from her udder, to our knowledge, for twenty-nine months, and for the last sixteen months, at least, almost continuously. As her second abortion occurred four years and seven months previous to the last milk test, the organism must certainly have persisted since that time, and in all probability since the time of her first abortion, or for a period of five years and seven months. Separate tests made of milk from each quarter of her udder on May 5, 1913, showed that all quarters of this organ were infected.

Cow 751 has aborted twice, in her second and third pregnancies, on December 19, 1911, and on February 11, 1913. Abortion bacilli were found in placenta at first abortion, but not in fetus, and in both placenta and fetus at the last one. Repeated tests of vaginal scrapings proved that the bacillus was eliminated through this channel up to and including the thirteenth day following abortion. Several subsequent tests were negative. In one other animal the vaginal scrapings were found to be infectious forty-six days after abortion. McFadyean and Stockman[2] found that the bacillus had disappeared from the uterus of a cow killed one month after aborting.

One observation made in connection with this cow proved that uterine discharges containing abortion bacilli can be exposed to the weather for a considerable time and the bacilli remain alive. A large quantity, perhaps 250 c.c., of clear mucus containing islands of chocolate-colored flocculent material, was passed from her uterus on the eighth day after abortion. It was allowed to remain on the ground, exposed to the sun for ten days, the weather remaining clear for the most part and warm for the season of the year, February, by which time it had dried into a tough, leathery-like mass, which on being tested by guinea-pig inoculations was found to contain living abortion bacilli. Unfortunately the material left after the tenth day of exposure was accidentally destroyed, so that we were not able to determine the maximum length of time that the bacillus will remain alive under these conditions.

This cow's milk was found to be infected at the first test made, nine days after her first abortion, and was still found to be infected when last tested, February 15, 1913, thirteen and one-half months later. Twenty-nine tests were made in 1912, and four, in addition to the last one, in 1913. Of all tests made, thirty-one were positive and four negative. She has therefore eliminated the abortion bacillus almost continuously with her milk for thirteen and one-half months.

We have found the abortion bacillus to make its appearance in the milk of three cows before abortion occurred, and in one of these even before the beginning of a pregnancy which was terminated by an abortion. The one in which this occurred, No. 621, gave birth to a calf at term, on December 20, 1911. Tests of milk, made eight, thirteen, sixteen and twenty days after, were all negative. The next one, however, made sixty-five days after the birth of the calf, was positive, as were also two others, made six and fifteen days after this. She was served fifty-two days after the bacillus was first found in her milk, and aborted on November 4, 1912, two hundred and fifty-five days after it was found. Tests of her milk made in the third, fourth, fifth and sixth months of her pregnancy were all positive, as were also daily tests made the first week after abortion, and six others made at irregular intervals, the last of which was made on May 26, 1913. She has then continuously eliminated the bacillus with her milk, beginning nearly two months before the beginning of a pregnancy which was terminated by an abortion, and has continued to do so with great regularity up to the last time her milk was tested, a period of fifteen months.

The record of this animal shows that a cow's milk may become infected before conception, and seems to indicate that instead of the presence of the bacillus inducing immunity when introduced at this time, as has been supposed, it is stored in the udder until the uterus by becoming active furnishes a soil for its rapid multiplication. It seems, therefore, that any system of immunization that depends on the subcutaneous or intravenous injections of living cultures of this organism before conception is unsafe; for it would not only probably make most of the animals so treated carriers, and contaminate their milk, but would, at least occasionally, set up active disease. I do not want to be understood as opposed to efforts to evolve methods for immunization, and I hope that something can be done in this direction, but immunity in this disease seems to be such an uncertain quantity, and the possibilities for evil in this organism not only for animals but for man as well, so great, that we had better go slowly.

The two other cows in which the bacillus appeared in the milk before abortion are Nos. 616 and 760. In the first of these the abortion bacillus was found in the milk thirty-two days before abortion occurred; the next preceding test was made nearly a year before and was negative. Had tests been made between these it is possible that we would have found the bacillus present at a much earlier date. 35 tests of her milk have been made subsequent to the first positive one, of which 13 were positive and 22 negative, the last one giving positive results being made eleven months after her milk was first found to be infected; 4 succeeding tests were negative. She therefore began to eliminate the abortion bacillus with her milk at least a month before abortion, and continued to do so intermittently for eleven months, after which it seemed to disappear, though owing to the intermittent character of its elimination we cannot be sure of this until other tests are made.

The abortion bacillus was found in the milk of cow No. 760 sixty-three days before her first abortion, which occurred in the sixth month of her second pregnancy; but 4 tests made about four months before abortion were negative. She aborted a second time in the eighth month of her next pregnancy, abortion bacilli being recovered from placentæ and fetal organs of both pregnancies. Sixteen tests of her milk have been made at intervals of from one day to two and one-half months, the last being made eleven months after the first positive one. Thirteen of these gave positive results.

Three cows, Nos. 171, 503 and 638, have never aborted, yet have continued to harbor the abortion bacillus in their udders. They are somewhat like those cases in man which continue to harbor the typhoid bacillus though they have never manifested symptoms of the disease. For some reason, the uteri of these cows seem to have either inherited or acquired sufficient resistance to prevent the organism from developing there, at least to such an extent as to produce abortion, though it continues to persist and to multiply in their udders; sufficient general immunity not being produced to drive it from this stronghold. Has the abortion bacillus, present in the udders of these cows, induced immunity in their uteri which it failed to do in cows Nos. 637 and 621, or must we regard these organs as naturally immune in these cows, or is there some other reason?

Mohler and Traum,[3] Larson[4] and others have shown that some cows react to the complement-fixation test but do not abort. No doubt many such are of the kind just described, and that the reaction depends on the actual presence of the abortion bacillus.

In other words, a cow reacting to this test probably has the organism either in her udder or uterus.

This type of carrier is a dangerous one, because unsuspected, and can only be found by making milk tests or one of the serologic tests. Some simple reliable test is urgently needed and it is to be hoped that such an one will be perfected in the near future.

The records of these cows are as follows:

Cow 171 was born at the Experiment Station, has produced eight normal calves and has never aborted. Abortion bacilli were found in her milk the first time it was tested, April 24, 1911, about three months after the birth of her last calf. 36 tests were made in 1911, in April, May, June, August and November, all of which proved to be positive. She was served six times, beginning about a year after the birth of her last calf, but did not become pregnant and was killed, March 21, 1913, when abortion bacilli were still found in her udder, over twenty-two and one-half months after they were first found. The strain of bacillus eliminated by her was particularly virulent for guinea-pigs.

Cow 503 came to the Station when eighteen months old and is known to us to have never aborted. She has produced five calves and is again due to calve in October. Tests were made of placenta of last pregnancy, but no abortion bacilli were found. The first test of her milk, made in November, 1910, showed the abortion bacillus to be present, and it was still present in December, 1912, over two years later. 28 tests made in 1910, 1912 and 1913, showed the bacillus to be present in 17 and absent in 11.

Cow 638 has not aborted since she came to the Bureau Experiment Station. She was purchased from the Maryland State Experiment Station five years ago, and according to the records of that institution had not aborted up to the time we received her. She has produced five calves since then. The abortion bacillus was found in her milk the first time it was tested, January 24, 1910, and also at the last test, June 6, 1913, or over three years and four months later, 57 milk tests were made as follows: 23 in 1910; 18 in 1911; 6 in 1912, and 10 in 1913. 49 of these were positive and 8 negative; all those made this year being positive. Separate tests of milk from each quarter of udder, made on February 2, 1911, showed all quarters to be infected. Similar tests made on May 6 and on June 6, 1913, showed three-quarters to be so.

Nine other cows, which have aborted in from the fifth to the eighth month of their pregnancies, have already been eliminating the abortion bacillus, some continuously, some intermittently, for periods varying from two and one-half to twenty-nine months, and if kept under observation longer I have no doubt will continue to do so for months and years to come, for in none of them is there evidence of the infection dying out.

One cow, No 758, that aborted a fetus in which the abortion bacillus was demonstrated, has given negative results to all milk tests thus far made. She is certainly the exception that proves the rule. Her abortion occurred in the seventh month of her second pregnancy. It is possible that even in this cow more frequent tests would have revealed the bacillus in her milk, for we have one other cow the milk of which shows infection only at long intervals.

SUMMARY. Of the 19 cows under discussion, 18 have eliminated the abortion bacillus with their milk, 16 are known to have aborted, 3 have not aborted but eliminated the bacillus with their milk, and one aborted, but we were unable to find that her milk was infected though abortion bacilli were found in the fetus. 1 cow is known to have been eliminating the bacillus with her milk practically continuously for four years and three months; 1 almost continuously for two years and five months and the organism must have persisted in her body for at least four years and seven months; 1 almost continuously for thirteen and one-half months; 1 continuously for fifteen months; 1 intermittently for eleven months; 1 almost continuously for eleven months; 1 continuously for six and one-half months; when she became dry and the bacillus was still present in her udder tissue thirteen and one-half months later; 1 intermittently for over two years; 1 almost continuously for over three years and four months, and 9 continuously or intermittently for from two and one-half to twenty-nine months.

Since different strains of this organism seem to possess widely different cultural characteristics as well as degrees of virulence, it is possible that animals infected with other strains than those with which we have worked may give different results. Fabyan,[5] however, found out of a herd of 12 cows 2 which eliminated the organism in their milk. One of these had aborted a week before in the eighth month of pregnancy and the other gave birth to a normal calf eleven months before. Another cow aborting at the third month was negative. These results are confirmatory of our observations.

Persistence in Small Experiment Animals. Just a word as to the persistence of the organism in the tissues of guinea-pigs, rabbits and mice. We have recovered the bacillus from the spleens of guinea-pigs showing lesions seventy-one and seventy-seven weeks after infection. Tests made of five other guinea-pigs which had been injected with the abortion bacillus twenty-one to twenty-seven months previously, and which showed only very slight lesions on autopsy, were negative.

The apparently normal spleen and liver of a rabbit, which had received three intravenous injections of abortion bacilli, were found to contain the organism one hundred and thirty-one days, or nearly nineteen weeks after the last injection was made. The organism was found to be present in the spleens of three white mice, in which it produced lesions one hundred and three days, or nearly fifteen weeks, after inoculation.

Fabyan[6] reports finding the organism to be present for sixty-seven weeks in guinea-pigs; ten weeks in the spleen of a rabbit, and for considerable periods in the tissues of monkeys, rats, mice and pigeons after injections with abortion bacilli; though, with the exception of the guinea-pigs and mice, without producing lesions.

CONCLUSIONS. 1. The bacillus of infectious abortion, or at least the strains with which the Experiment Station has worked, may, and in most cases does, persist in the udders of cows that have aborted, for years and possibly for the balance of their lives; and during this time is eliminated more or less continuously with their milk.

2. It may make its appearance in the milk months before abortion occurs, even before a conception that is terminated by an abortion.

3. It may be eliminated for years from the udders of cows that never aborted.

4. It may persist in the genital tract for as much as forty-six days after an abortion; and the bacilli contained in uterine discharges may resist the action of sun and weather for at least ten days.

5. It may appear in the placenta of a normal pregnancy subsequent to an abortion.

6. It may persist in the spleens of inoculated guinea-pigs in which there are lesions for seventy-seven weeks, and in the spleens of inoculated rabbits for nineteen weeks without producing lesions.

It is to be hoped that we will soon know more about this strange organism. Its variable character and the seeming existence of many strains, no doubt, are responsible for much of the confusion in the past, and the fact that it seems to prefer primitive embryonic tissue as a soil suggests that it may be an organism not yet fully adapted to differentiated tissue, and ready, by a process of mutation, to assume additional pathogenic significance in several species of animals. In other words, it may be the possible parent germ of some future pathological factor.

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THE CHAIRMAN: The next paper is "The Value of Abortin as a Diagnostic Agent for Infectious Abortion in Cattle," by Dr. K. F. Meyer and Dr. J. B. Hardenbergh.

THE VALUE OF ABORTIN AS A DIAGNOSTIC AGENT FOR INFECTIOUS ABORTION IN CATTLE

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Because of the limited time at our disposal, the writers decided that a long discussion of previous experiments along this line or a lengthy enumeration of the investigators who have contributed to this subject, could not be attempted. This paper, therefore, is an extract of only what we believe to be the most essential and interesting facts determined by our experiments with "Abortin" to date.

MacFadyean and Stockman mentioned in their report on infectious abortion noteworthy results with a glycerin extract of B. abortus prepared in a manner similar to that used for mallein and tuberculin, and called by them "Abortin."

A 1 per cent. glucose serum glycerin bouillon, infected with B. abortus, was grown for six weeks at 37° C., sterilized for two hours at 99° C., then filtered through filter paper or Berkefeld candles, and 1 per cent. carbolic acid added, or, if not used immediately, concentrated on the water-bath to one-tenth of its volume.

This preparation, injected subcutaneously or intravenously, produced in infected animals a rise of temperature which began about the fourth hour and lasted about fourteen hours. In normal animals no reactions were recorded. Based on these results, the English Commission considered the abortin reaction to be specific.

This statement has been the subject of considerable comment, and an attempt has been made in various laboratories to confirm or deny the diagnostic value of this product. Belfanti came to the conclusion that it should be considered unreliable until contrary proofs are given, and doubted the specificity of the reactions. Zwick and Zeller, in their experiments with abortin, compared with serum reactions, reached the conclusion that it is not a suitable diagnostic agent. Casper, Brüll, De Vine, Mohler and Traum, Giltner and others have all done work along this line with more or less unsatisfactory results.

In general, these results were not as reported by MacFadyean and Stockman and because of this fact and that we were constantly receiving inquiries regarding the value of "Abortin," at present commercially distributed, we deemed it highly important to form our own opinion and undertook a series of experimental tests.

The most virulent strains isolated by ourselves were grown in Holth flasks in glycerin bouillon at 37° C. for eight to sixteen weeks. The cultures when well grown were tested for purity. The pure cultures of the different strains were poured together and killed by putting them for one hour in a Board of Health sterilizer, then concentrated to one-tenth of its volume. The syrupy fluid was then filtered and stored in sterile brown bottles. When ready for use it was diluted with saline solution containing 0.5 per cent. carbolic acid and 1 per cent. glycerin.

As will be shown later, we found that a "purified" abortin acts more specifically than the preparation just mentioned. This is probably due to the fact that the unspecific pyogenous substances disintegrate rather quickly.

The "purified" or precipitated dry abortin was prepared as follows: A twelve-week-old culture, obtained as above and concentrated at 40° C. to one-tenth of its volume, was first centrifuged and then filtered. The comparatively clear, brownish, syrupy fluid obtained was precipitated with twenty parts of absolute alcohol to one part of concentrated abortin and afterward washed with absolute alcohol and ether. The precipitate, filtered off, was smeared on sterile clay plates and dried over sulphuric acid in a vacuum. A granular whitish powder was obtained which was not hydroscopic and was very readily soluble in saline solution.

The antigenous properties of our various preparations were determined by injections of rabbits and subsequent tests of their serum by agglutination. Ordinary abortin "brute," from young cultures, produced a very small amount of immune bodies which disappeared in about twenty-five days. Older cultures produced more immune bodies, but these disappeared as quickly as the others.

"Precipitated abortin" produced the highest amount of immune bodies. They appeared about the fourth or fifth day, reached their height in ten to fifteen days and disappeared altogether in about forty-five days. From these tests we concluded that precipitated dry abortin, particularly from old cultures, has greater antigenous properties than ordinary abortin "brute." This point is noteworthy when comparing later our tests. The "abortin" was also used as an antigen in the complement fixation test and proved very satisfactory.

In conjunction with the abortin test, serum tests were carried out simultaneously. The technic used was the same as that recommended by Holth and Sven Wall, but time will not permit our going into details along this line. For a positive diagnosis we demanded a complement-fixation of at least 0.05 with an agglutination of 0.05, or a complement-fixation alone of 0.02 and an agglutination alone of 0.01.

GENERAL TECHNIC OF THE TESTS. This was essentially the same as for the tuberculin test, two or three preliminary temperatures being taken, followed by the abortin injection either subcutaneously or intravenously.

Following the injections, the temperatures were taken at the second hour and thereafter at intervals of two hours until the eighteenth or twenty-fourth hour.

The rise in the temperature, if noted, usually occurred between the fourth and twelfth hours and remained at this height for from two to sixteen hours. In a number of cases a double rise of temperature was recorded. Occasionally late and atypical reactions were noted. Local reactions were never noted if but 1 c.c. of abortin "brute" was inoculated subcutaneously.

In some of our earlier experiments, 5 to 10 c.c. of the preparation were injected, and a large, hard, painful swelling developed, which disappeared slowly. Abscess formation was never noted. A very few animals showed general symptoms of trembling, slobbering, accelerated respiration, inappetence, and reduced milk secretion.

EXPERIMENT NO. 1. This was conducted on artificially infected animals, and for this test three heifers, Nos. 45, 46, and 47, were used. All had been fed and inoculated with vaginal discharge and showed high complement-fixation and agglutination reactions Nos. 45 and 46 reacted to the intravenous injection of 2.5 c.c. with a rise of temperature of 2.5° and 3.2° F. respectively. No. 47 failed to give a reaction, which was strange, inasmuch as she gave a complement-fixation of 0.02 and an agglutination of 0.002. This experiment showed that "abortin" is not absolutely reliable as a diagnostic for artificially infected animals.

Experiment No. 2. *Tested on Naturally Infected Animals.* A herd at the State Experimental Farm, numbering 48 animals, and in which infectious abortion had existed for several years, was used. The abortin applied was a mixture of four different strains and was not concentrated, but simply passed through Berkefeld filter candles and preserved with 0.5 per cent. carbolic acid. The herd was divided into two lots of 24 animals each, and the injections made subcutaneously with abortin in the amount of 2.5 c.c. At the time of the test 23 animals reacted to the serum test; of these reactors 10 had aborted. By means of the abortin test, 13 animals were found to react, with a temperature rise to over 104° F. and a curve which is characteristic for tuberculin reactions. The difference in the rise of temperatures ranged from 2.6° to 5.2° F. Of the 13 abortin reactors, 6 were reactors to the serum tests, while 7 also reacting to the abortin were, according to the serum tests, not infected with B. abortus.

Several animals, Nos. 16, 17, 45 and 49, which had aborted during the last year, and of which Nos. 16, 45, and 49 gave positive reactions to the serum tests, failed to react to the abortin. No local reactions or general symptoms were noted.

Conclusion. The test applied to herd No. 1 showed that the inoculation of abortin is a very unreliable method of diagnosing infectious abortion, particularly when bouillon filtrates are applied subcutaneously.

The results showed that a large number (53.8 per cent.) of the entire abortin reactors were found in *uninfected healthy* animals. The test, therefore, is considered extremely unreliable and unspecific with this preparation.

An interesting feature should be mentioned here, namely, that several of the animals which reacted to the abortin, and were not infected by B. abortus, according to the serum test, had been subjected to various tests with tuberculin preparations or had been vaccinated with large doses of human tubercle bacilli according to the method of Pearson. Several of these animals were also infected with tuberculosis, as subsequent autopsies revealed. We are not in position to explain satisfactorily this occurrence of reactions in such animals, but suspect that they are probably due to proteins or split products present in the bouillon broth.

Experiment No. 3. A dairy herd owned by Mr. A., consisting of 19 animals, in which recently 2 cases of infectious abortion had been bacteriologically determined, was tested with abortin.

The preparation used was the same mixture as used in Herd No. 1, but it was concentrated to one-tenth of its volume and the abortin "brute" dissolved in the quantity of 1 c.c. to 9 c.c. diluted fluid mentioned in the introduction. Each 10 c.c. contained therefore, 1 c.c. of abortin "brute." All injections were made subcutaneously.

According to the serum tests, 3 animals, Nos. 6, 8 and 16, were infected. Out of these three, 2, Nos. 6 and 8 had aborted recently. Both animals which had aborted, reacted to the abortin test, but in addition to that, two more animals, Nos. 2 and 19, which were not infected, according to the serum test, gave an abortin reaction.

Conclusion. The results with concentrated, re-diluted abortin by subcutaneous injections are accurate, particularly when recent aborters are tested; but, inasmuch as two reactions occurred in healthy non-infected animals, the reactions did not seem to be specific.

In this herd granular vaginitis had existed for some time, and by the tests applied the deductions can be made that this local disease of the genital tract is not responsible for abortion, this being only a confirmation of what has been reported by Zwick and Zeller, Eber and others.

EXPERIMENT NO. 4. This herd (No. 4) consisted of 32 purebred Guernseys, in which infectious abortion had existed for the last four years, and we were able to apply the abortin test with somewhat different technic, namely the herd was divided and the injections made subcutaneously and intravenously. According to the serum tests, 15 animals were affected with B. abortus. Altogether, 12 animals had aborted in this herd. Out of these 12 animals, 7 reacted to the abortin with a temperature rise of from 2.4° to 5.5° F.

In comparing the results obtained by the different methods of injection, we found that 62.5 per cent. were diagnosed when the abortin was applied intravenously; while only 28.5 per cent. were found to react following the subcutaneous application. Of the healthy animals, 1 reacted to the intravenous injection, and none to the subcutaneous injection.

Conclusion. From the foregoing tests on 32 animals, injected subcutaneously and intravenously, we concluded that the intravenous method gives more gratifying results; but the prevailing non-specificity of the reactions in the other tests was not eliminted by the intravenous method.

Experiment No. 5. The conclusion drawn from the experiments on herd No. 4 warranted further tests, and an opportunity was given to select 22 animals out of a herd of over 100 pure-bred Ayrshires. These animals were tested by the intravenous and subcutaneous method with an old, re-diluted abortin of known antigenous properties. Of the 14 reactors to the serum test, 12 animals had recently aborted. 13 animals, in all, reacted to the abortin with a temperature rise varying between 3.4° F. to 5.7° F. Two animals following the intravenous injection showed general symptoms. Nine of the abortin reactors were also reactors to the serum test. On the other hand, four abortin reactors were, according to the serum test, not infected with B. abortus and neither had any of these four animals ever aborted.

When again comparing results of these two methods, we noted that by the intravenous method 100 per cent. accurate results were obtained in this herd, while the subcutaneous injections gave only 18.5 per cent. accurate reactions. On the other hand, the percentage of non-specific reactions in healthy animals by the intravenous method was 60 per cent., and higher than the non-specific reactions in healthy animals from the subcutaneous injections, these being 33.3 per cent.

Conclusion. Our conclusions from this herd were that the abortin is non-specific, but that certain more or less valuable information can be obtained by its application intravenously.

Experiment No. 6. To prove the above statement that the intravenous method may give valuable information, we considered it wise to test a small herd in which abortion had recently occurred, purely by the intravenous method. Through the courtesy of a friend of the board a herd of 18 animals was tested with an abortin preparation the same as used for herd No. 5. According to the serum tests, 4 animals were infected. One animal had aborted two days prior to the test. All four of the animals gave positive reactions to the abortin test, with marked elevation of temperature, showing differences of from 1.7° to 4.6° F. None of the healthy animals reacted to the abortin in this small herd where abortion had existed for a short time, and we were highly gratified at the 100 per cent. positive results in this instance.

Experiment No. 7. It was thought that the high percentage of failures in absolutely healthy animals which deprived the preceding abortin tests of their specificity might perhaps be overcome by purifying the abortin, and for this reason a herd was tested with "precipitated" and with "plain" concentrated abortin preparations, prepared as already explained.

The herd (No. 7) selected for this purpose consisted of 69 animals in which, according to very complete records, 31 animals had aborted. According to the serum test, 26 were still showing immune bodies in the serum. 20 animals reacted to the abortin test, out of which 5 were healthy, leaving only 15 serum reactors which actually reacted to abortin. The temperature rise with the precipitated abortin showed differences between the preliminary temperatures of from 2.5° to 5.1° with an average of 3.9° F. With the plain abortin, a difference of 2.2 to 5.2°, and average of 3.7° F. was recorded.

Comparing the results with the ordinary "plain" and the "precipitated" abortin in this herd by the intravenous method, we found that out of 36 animals 87.5 per cent. were diagnosed correctly with the precipitated preparation, while only 30 per cent. were correctly diagnosed with the plain preparation.

The plain abortin gave 15 per cent. failures and the precipitated abortin only 10 per cent. failures in non-infected animals or such bovines as did not show any immune bodies in the serum tests.

Conclusion. Our conclusions here were that by using a purified product the percentage of non-specific reactions could be slightly reduced, but it has to be proved by further tests whether or not this observation is a constant one, as we were not able to absolutely eliminate the non-specificity of the reactions.

EXPERIMENT NO. 8. As explained above, abortin is commercially distributed and it was considered advisable to test this preparation and if possible determine its practical value. It may be mentioned at this time that this preparation had no antigenous properties, whatever either by animal inoculation or by using it as an antigen in the complement fixation test.

A herd (No. 8) consisting of 61 animals, in which infectious abortion had existed for the last four years, was injected according to the instructions give by the manufacturer. The dose was 4 c.c. injected subcutaneously. The preparation was dated June 15, 1912, and the laboratory No. was 8815.

Conclusion. Commercial abortin, as at present prepared, is of little if any value. Of the 61 animals in this herd, 25 per cent. were shown by the serum test to be infected with B. abortus. The results of the commercial abortin injections showed but two reactions, both of these being unspecific and occurring in animals that showed no immune bodies in the serum test.

Experiment No. 9. *The Conjunctival Test.* It was thought advisable to try this method of application, and all the animals of herd No. 7 were tested by the ophthalmic test, 2 to 4 drops of a 5 per cent. solution of precipitated abortin in saline solution being instilled into the conjunctival sac, as is customary for such tests. The readings from the tenth hour did not reveal any reactions and our conclusions are that this test cannot be used for the diagnosis of infectious abortion.

Final Conclusions on Foregoing Experiments. 1. From the above-stated experiments with abortin on over 200 animals we found that this product permits a conclusive diagnosis in 59 per cent. of the cases of infection, if the serum reaction is taken in consideration for comparison. In healthy animals about 29 per cent. unspecific reactions or failures were recorded, leaving only 71 per cent. of the abortin reactions supported by a positive serum reaction.

2. Injections of this product should always be made intravenously, as the danger of anaphylactic symptoms are few.

3. The abortin test in the form and with the preparation recommended by the English Commission is unreliable and misleading.

4. Commercial abortin as now prepared is of no value in determining the extent of the infection in a herd.

5. Encouraging results are obtained with a precipitated or purified abortin applied intravenously, but the reaction is not absolutely specific, as a high percentage of healthy animals also reacted.

6. This non-specificity is more frequently observed with ordinary plain abortin than with the purified product.

7. The reactions are mostly typical, but only when the purified product is used.

8. In recent or newly infected herds the results are much better than in old infected herds.

9. We cannot support the opinion expressed by Giltner, that the abortin may have a certain immunizing effect against a natural infection, as some heifers injected with our best abortin have since become infected and have aborted.

10. The serum tests, namely, the agglutination and complement fixation, taken together, are the most reliable methods we have to determine the extent of infectious abortion in a herd and to detect the animals which are or have been infected with

B. abortus. These tests should, however, be made two to three times a year.

THE CHAIRMAN: Gentlemen, you have heard the papers which have been read and they are now open for discussion.

DR. FERNEYHOUGH: Mr. Chairman, there was one question in particular that I wanted to ask Dr. Cotton, and that is, whether in his opinion the infection takes place through the udder or through the uterus? I want to get all the information I can on the subject. It is one of very great interest and one which has not been referred to to any great extent in our meetings until lately. I have just been wondering in my own mind whether the infection was communicated through the udder itself by means of the external opening in the teat, or whether it was through the system. It is not clear in my own mind from his statement as to how the bacillus could get into the udder or uterus. I also understood him to say that the reproduction took place only in that place.

THE PRESIDENT: Is there anyone else who desires to take part in the discussion?

DR. REICHEL: Mr. Chairman, I have made quite a number of notes, but I do not want to take up too much time. There are, however, one or two things that I would like to refer to. One point in particular I want to bring out, and that is that I do not believe that up to the present time it has been proved or thoroughly established that the infection takes place through the udder. Bacilli are found in the milk, and of course they come from the udder; but whether or not the udder is really infected I think is questionable. It seems that the bacillus may be silent or inactive in many cases for months after the injection. It has been shown that the result of the injection in a guinea-pig depends largely upon strain, and if the strain is not conducive to its growth it remains inactive for months. Now, the question which suggests itself to my mind is, whether it is not possible that the location of the organism in the udder comes from the fact that the organism gets into the udder through the blood stream. In other words, whether it is not filtered out, through the udder acting as a sort of filter. It seems to me that this is a very important point. We have tried out various preparations of abortin on a number of herds, and we found that in some instances there seemed to be no reaction. We have had a recent experience in testing the abortin in which some 60 per cent. of the animals failed to react in any manner whatsoever, but after getting the strain from that particular herd and changing the preparation, and then trying it upon the same animals, in about two months the reactions were much more satisfactory.

I should like to have heard the entire paper of Dr. Williams. I am not sure that I understood what he wanted to bring out. The reactions as he spoke of them are certainly not clear to me. In other words, the reaction was 1 to 10, 1 to 25 and 1 to 50, but I was not sure whether we are to take those for negative or positive. I think anything less than 1 to 100 should be regarded as suspicious, but those above 1 to 100 may be relied upon.

The Chairman: Does anyone else wish to ask any question or make any remarks?

Dr. Traum: Mr. Chairman, I would like to make a few remarks. Dr. Williams seems to draw most of his conclusions from the charts which he presented. If you will examine those charts you will find most of the animals showed an agglutination titre of less than 1 to 50 and but few higher than 1 to 10. While we do not know definitely just where to place a positive reaction, still it seems to me that a reaction of less than 1 to 100 should not be considered as positive, especially so if the complement-fixation test has not also been tried. If we were to take that same ground with other diseases we would get into some embarrassing positions. We know that in testing horses for the presence of glanders by the agglutination test that we often get an agglutination titre in sera from normal animals as high as 1 to 400 or 1 to 500, and that in a certain percentage of cases of glanders we get an agglutination of 1 to 400 or less; but we don't dare conclude, since some known glanders cases agglutinate only in proportions of 1 to 400 or 1 to 500, that all sera giving such titres should be considered positive. The same holds true in abortion. It is therefore advisable to lean more toward a higher agglutination value than to hold to the lower figures, for the present at least.

There is a tendency to accuse the abortion organism of many crimes, and this is especially true in cases of retained afterbirth. There is no doubt at all but what the definition of infectious abortion would not be complete without mentioning the retention of the placenta as one of the manifestations, but we cannot consider practically all cases of retained afterbirths as being produced by B. abortus; at least such conclusions cannot be drawn from our work. We have had experience recently in a herd in which there were about fifty animals in which abortion existed. Some forty more odd animals were bought and added to that herd, being placed in a new wing of a U-shaped barn. Soon after they arrived, and for a few weeks after their arrival, practically all cows that freshened from this lot retained their afterbirths. We made serum tests of about fifteen of those animals and not in a single case did we get a positive reaction to either the complement-fixation or agglutination test, and there were also no abortions in that lot of forty. The retained placenta is an important symptom in the infection caused by B. abortus but still we are forced to the conclusion that we must not consider all such cases, even when occurring in a large percentage of a herd, as having been produced by this bacillus.

Now relative to the relation between abortion and white scours of calves. We know that upon some farms where abortion exists this disease of newly-born calves is also found. Jensen, in 200 or 300 cases of scours, found B. abortus as the primary cause in one case. Experimentally we failed to produce scours or any ill effect upon two three-day-old calves by feeding 90 c.c. each day of a bouillon culture to each calf for three days; but of course, we might not have had the proper method of infection, or we might not have given it early enough. At any rate we could not produce it with these exceedingly large doses. In the case of white scours we might consider, or rather it is possible that the abortion bacillus in conjunction with some other organism may be responsible for this condition. Drs. Schroeder and Cotton have shown that streptococci when inoculated into experimental animals will not produce any noticeable changes, but when inoculated in conjunction with B. abortus abscess formation and other changes would take place. We had an experience recently which coincides with their finding. In a herd where infectious abortion existed to a limited degree there appeared a severe form of catarrhal mastitis. Cultures made from the secretion of the udders, drawn carefully, resulted invariably in the recovery of streptococci, and in most cases pure cultures were obtained. One of these cows was slaughtered and the udder brought soon afterward to Dr. Mohler's laboratory. Cultures of streptococci were again obtained, and these were placed aside after three or four days' observation and looked at again only last Saturday and to my surprise I observed two colonies of B. abortus in a tube thought to contain a pure culture of streptococci. What part the B. abortus played in the production of the mastitis I don't know, but they were there and may have played an important part in the production of the streptococcic mastitis.

Dr. Williams made one other point which I would like to discuss briefly. He said that cows soon after abortion fail to give serum reactions. I think that is a fact in some few cases, but not in anywhere near the percentage that he gives. Our attention was recently directed to a herd of about forty cows in which fifteen or sixteen animals had aborted. Most of these abortions were within two months, and some within two to five days, of the time that the blood was drawn and not a single one of these cases failed to react to that test. I must, however, state that one cow that had aborted two days previous to the drawing of the blood gave the lowest reaction. In another outbreak, where the disease had existed for some time, but where it became somewhat more pronounced recently, I think there were about ten that aborted, most of them within two weeks or less of the drawing of the blood and they all gave a high agglutination titer. There is no question but what some animals have failed to abort even when giving a high serum reaction, and others failed to react soon after abortion, but to say that the percentage is as high as 80 per cent. of those infected with infectious abortion who fail to react to the agglutination test soon after abortion, seems entirely too strong.

Dr. Rogers: Mr. Chairman, I am not a bacteriologist, but I am merely asking for information in regard to this important subject. I think that we are all pretty well convinced that up to the present abortin is not nearly as reliable as the tuberculin, and, sitting here today, a reason for that occurred to me. It may be a piece of perfect nonsense, not being a practical bacteriologist, but I am going to ask some of the gentlemen to answer this question: We know that certain chromogenetic bacteria, while growing perfectly well on a certain culture medium, will lose their power of forming color, or lose their power of emitting light, while growing well. Is it not possible that the failure of abortin to do what tuberculin has done is due to its not being as well cultivated on the proper medium? I have read of a number of instances where an almost infinitesimal alteration of the culture medium is followed by a very very great difference in the properties of the bacteria. It grows and multiplies, but certain of its characteristic properties have left it. It occurred to me, sitting here, to ask whether that could possibly be a factor. I am asking for information only.

A MEMBER: I would like to ask Dr. Cotton if he knows of any antiseptic solutions injected vaginally that will have any effect on the bacillus?

DR. TURNER: I simply speak from the standpoint of a practitioner, and one point was brought out that seems to be difficult for the average practitioner to believe; that is, that every case of retained placenta indicates an abortion.

I have had under my observation for from twelve to fifteen years two large herds. One of these herds, to my knowledge of over ten years, has had only one case of contagious abortion, and that was demonstrated by Dr. Mohler's laboratory. Now, in a herd of a hundred animals or more, we only have one or two abortions a year. Strange to say, last year, only one or two abortions occurred in this herd, and one of these abortions was diagnosed as contagious abortion.

Now, I know, from hard experience, that we have a great many retained placentas in that herd; and it would seem to me that if these placentas were all indicative of abortion in the herd, we would have more abortions. In other words, abortion in the herd is almost nil. With one or two a year, in a hundred cows, it would be hard to state that that herd was affected with contagious abortion; and yet I know that possibly ten or twelve cases of retained placentas occur in that herd every year, and have occurred for ten years.

So that it seems difficult for the average practitioner to believe this, although I go to Dr. Williams for a great many of my teachings, and have the greatest respect for his teaching, as he knows, but just that one point makes somewhat of an impression on me.

DR. MAYO: In regard to retained placentas, I recall very well the shipping of a herd of fifty dairy cows to Cuba that were not, so far as I could determine beforehand, infected with contagious abortion; nor in the two years and a half that I had it under my observation afterward was there any abortion in the herd. After reaching Cuba we had the greatest time; there wasn't a cow there for the next six months but what practically had a retained placenta, and there was practically no infectious abortion in the herd, and no means of accounting for it.

THE CHAIRMAN: Is there anything further? If not, I will call on the men, in the order in which the papers were given, to answer such questions as may come within their purview.

DR. WILLIAMS: Mr. Chairman: The speakers generally have placed an interpretation upon our communication which has not been wholly warranted. The aim of our paper was to submit data without conclusions, and several of the speakers have assumed that we have submitted data with conclusions. Dr. Reichel raised the question, whether we meant when we said that an animal had reacted at 1 to 10, that the animal was infected with abortion. What we meant on our charts was, that at 1 to 10 the blood of the animal agglutinated, or failed to agglutinate, and there was no intention to say whether that meant that the animal was or was not infected with abortion bacillus. The aim in that respect was to show that the chart did not indicate whether the animal was or was not infected; it did not show to us a line of demarcation between the sound and the unsound; that our lines between the healthy and the diseased are hypothetical; that one investigator says a reaction of 1 to 50 means infection, another that 1 to 100 means infection, and so on.

Dr. Traum also brought up the question as to where the line of demarcation is, which we have not in any sense attempted to fix.

In reference to the retained placenta, our statement was not positive, but purely comparative; and Dr. Traum in his own remarks verified that. He says that no doubt numerous cases of abortion are due to abortion infection. We merely stated that the presence of retained placenta, according to our judgment, was just as good evidence of the presence of the infection of contagious abortion as was the phenomenon of abortion.

Dr. Traum states that he has made tests in this respect, but he failed to state in his remarks whether those tests were made near to the time of the retained placenta, or at a considerable time from the period of retention. That seems to us to make a very great difference.

Also in scours Dr. Traum has placed upon our data a conclusion which we have not affixed. We placed before you some data in regard to the reaction to the abortion agglutination test, in some calves which had been affected with scours. We did not say what it meant, because we did not know what it meant.

I think that Dr. Traum is perfectly right when he says that perhaps our data in Chart IV, in relation to the reaction of the blood of cows at or near to abortion, was overdrawn. I would not at all be surprised if the conclusions might be overdrawn, but the facts cannot be overdrawn, because they are simply data upon the small number of cases which we had. I would not suggest that that would hold true after a broader investigation. We simply submitted them for what they were worth.

A Voice: What is the action of antiseptics on the abortion bacillus in the vaginal discharges? That is, if there are any antiseptics that will kill the bacillus, or have any effect on it in the discharges.

Dr. Schroeder: Mr. Chairman: There is just one question to which I wish to reply. Dr. Reichel asked, if I understood him correctly, whether the udder is actually infected with the abortion bacillus or whether the bacillus is simply eliminated through the udder from some other portion of the body? At the Experiment Station of the Bureau of Animal Industry we had the opportunity to make post-mortem examinations of several cows that had long expelled abortion bacilli with their milk. From the cows we obtained and tested, with careful precautions against contamination, various tissues, as follows: liver, spleen, blood, udder, lymph-glands, milk, etc. Abortion bacilli were found in the milk, udder tissue and supramammary lymph glands, and not in the spleen, liver, blood, etc. From this we concluded that, in cases like those in question, seemingly healthy cows that produce milk contaminated with the abortion bacillus, the bacillus actually occupies the udder as its habitat and does not merely pass through it on its way out of the body. Before the cows were killed the teats were ligated with tape, so that nothing could pass through them into the udder during the death agony.

Dr. Cotton: Mr. Chairman: I want to make one addition to what Dr. Schroeder has said in answer to Dr. Reichel. It is this: that some of the cows he mentioned were dry, and had been dry for a long time when autopsied, yet the abortion bacillus was still found to be present in tissue from their udders.

In answer to Dr. Farneyhough's question, as to whether the udder becomes infected directly through the teat or by way of the blood stream I wish to say that our observations lead us to believe that it is by the latter route; the bacilli gaining an entrance to the animal through the digestive or genital tracts, from either of which it could enter the blood stream and by this be carried to the udder.

In our earlier work with this bacillus, before we knew it was the bacillus, of infection abortion, we tried to infect a cow's udder by applying suspensions of it to her teats and manipulating them as in milking. Applications of this kind were repeated a number of times without causing infection. Of course, it will not do to draw conclusions from a single case, but the results of all our other work point to the blood stream as the route by which the bacillus reaches the udder.

In answer to the question, What is the action of antiseptics on the abortion bacillus in vaginal discharges?, made by a gentleman whose name I did not hear, I wish to say that I can give you no information at first hand, as we have done no work in this connection, but I believe Dr. Williams has, and no doubt can give the information desired.

Dr. Williams: In clinical experience, which is not fully formulated, we have shown, satisfactorily to ourselves, that we can favorably affect the infection of abortion in the genital tract by antiseptics. I would also add, while it is not mentioned in our paper, that we have shown, with a considerable degree of satisfaction to ourselves, that we can repress the reaction to the agglutination and complement-fixation tests by the disinfection of the genital tract.

Dr. Hardenbergh: Dr. Rogers asked a question as to whether or not the culture medium principally used is not responsible for the poor response of the abortin. Now, in reply to this, I might say that it is very evident that something is wrong with this preparation, and it is possible that the culture media is one of the causes. It would seem, however, that it is hardly likely, inasmuch as we are able to cultivate this bacillus on culture media and have it retain its virulence, so that when injected into animals it causes the characteristic lesions.

Dr. Traum: Dr. Williams and I do not seem to agree on extent; we rather agree on facts, but not on extent. I simply wanted to give my experience with regard to retained placentas. There goes forth an impression here that all retained placentas, or the great majority of them, are caused by the bacillus of abortion. Now, Dr. Williams wants to know at what times the blood was drawn in the cases of retained placentas that I mentioned. Well, they were drawn at various times, probably within the twenty-day limit, but practically every one of them failed to react to the agglutination and complement-fixation test, which would indicate it was something else. If it were one or two that failed to react it wouldn't matter, but every one of the fifteen cases tested failed to react to the complement-fixation and agglutination tests, indicating that the retention was due to some other cause. There wouldn't have been so many animals infected with the abortion organism and not show it in this test, and besides there was not a single case of abortion in that herd.

The Chairman: The next paper on the program is that of Dr. K. F. Meyer, "Specific Paratuberculous Enteritis of Cattle in America."

That was referred from the Committee on Diseases.

THE SPECIFIC PARATUBERCULOUS ENTERITIS OF CATTLE IN AMERICA[1]

By K. F. Meyer
Philadelphia, Pa.

Introduction. In my publication on the "Enteritis Hypertrophica Bovis Specifica,"[2] to which the writer refers herein, a complete description of the entire pathogenesis of the disease was given; however, only indirect proofs were offered that paratuberculosis is not related to tuberculosis, as at that time he had not succeeded in cultivating the specific organisms, nor could he report on any successful transmission experiments. So far only the experiments of Bang[3] were used as a criterion for the non-identity of bacterial dystentery with tuberculosis. Since that time, with the exception of one case of paratuberculosis in an imported Sussex heifer at the experimental station in Pretoria (Transvaal), no clinical nor bacteriologically suitable material came to the writer's notice until he became connected with the veterinary sanitary work in the state of Pennsylvania.

Pearson,[4] Beebe,[5] Mohler,[6] Clark,[7] Wills[8] and others have proved by their clinical and bacterioscopic examinations that paratuberculous enteritis (Johne's disease, or bacterial dysentery) occurs in an annually increasing number of cases in the United States. It has been pointed out by them that the economic loss will become one of a very serious nature if necessary steps for the control of this disease, which has been brought to this country by importation, are not taken.

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[1] Contributed to the Report of the Committee on Diseases.

[2] Arbeiten aus dem Institut zur Erforschung der Infektionskrankheiten in Bern, aus den Laboratorien des Schweizer Serum und Impfinstitutes Zweites Heft, 1908.

[3] 66de Beretning fra den Kgl. Veterinaer og Landbohojskoles Laboratorium for landokonomiske Forsog, 1910.

[4] American Veterinary Review, February, 1906.

[5] Ibid., September, 1908.

[6] Annual Report of the Bureau of Animal Industry of the United States, 1909 and 1910.

[7] Proc. Amer. Vet. Med. Assoc., Lansing, 1910, p. 368.

[8] Report of the Sixteenth Annual Meeting of the United States Live-stock Sanitary Association, Chicago, 1912, p. 44.

For reasons which are self-explanatory, from the introduction above given, it materially interested the writer to begin investigations in order to determine whether the disease commonly described as specific chronic enteritis in European countries is actually identical with the sporadic or epidemic cases found in this country. Opportunity was offered to study several cases (to which you are referred later) clinically as well as bacteriologically. The following points particularly are considered to be of material interest, namely:

1. The artificial transmission.
2. The natural infection.
3. The cultivation of the specific organisms.
4. The diagnosis.
5. The correlation of this disease to tuberculosis.

It was expected that when satisfactory results and conclusions could be drawn from this work, some more practical recommendations could be given for the control and, more particularly, for the prophylaxis of this disease. As outlined, the results will be reported under the above headings.

ARTIFICIAL TRANSMISSION

Liénaux and Van den Eeckhout[1] were the first to make attempts to transmit the disease to bovines. However, the results obtained are of no value, as a large amount of the material used was derived from sources not described in detail in their publications. It is not astonishing that they obtained, by their transmission experiments, localized tuberculosis. The experiments of Liénaux do not permit a decision as to the identity or non-identity of the paratuberculous enteritis with tuberculosis.

Bang[2] has succeeded in reproducing the disease in several calves by feeding large amounts of the diseased mucous membrane of the intestinal tract. Based on these positive results obtained, this investigator was justified in denying the tuberculous character of the disease.

Miessner and Trapp[3] succeeded, in three out of twelve calves, infecting by feeding or endogenous injections, and reproduced the disease with all of its characteristic symptoms and lesions.

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[1] Liénaux and Van den Eeckhout, Ann. de méd. vét., 1905, pp. 65 and 125.

[2] Loc. cit.

[3] Mitt. d. Kaiser Wilh. Instit. f. Landwirtsch in Bromberg, 1910, Bd. ii, Heft 3, pp. 219 to 286.

Recently, Malm[1] reproduced the disease in two calves by feeding of intestinal material.

The number of experiments is apparently small, and further information in this direction was therefore wanted.

My experiments were conducted with material from the following spontaneous cases:

Experiment No. 1

Jersey cow, owned by L. B. H., Coatesville, Pa., on September 2, 1910.

Diagnosis: Bacterial dysentery. Made an examination of rectal scrapings; removed October 24, 1910, to the State Farm, from which date up until she was killed in the agonal stage, on February 10, 1911, she lost weight and condition.

Autopsy Report: State Experimental Farm, February 11, 1911. Greatly emaciated, was killed in agonal stage. Surrounding of anus soiled with feces. Subcutaneous and intermuscular tissues, pale yellowish. Muscles, remarkably brown in color. Abdominal cavity contained a small amount of fluid. Thoracic cavity contained no fluid. Peritoneum, smooth and shiny. Rumen contained a small amount of dry material. Mucous membrane, normal. Reticulum and omasum contained a small amount of fairly dry contents. Abomasum, empty. Mucous membrane, reddened, covered by slightly adherent mucus. Intestinal tract, only opened in parts (used for feeding experiments). Ileum, end part, not very noticeably thickened, œsophagus-like, folded in longitudinal strips. Several portions of small intestines show slight swelling of mucous membrane, covered by liquid feces and pus-like chyme in patches, empty. Colon and cecum, pale, grayish, no thickening, partly empty. Mucous membrane, slate colored. Rectum, shiny appearance, longitudinal folds, dark red. Mesenteric lymph nodes, all swollen, lying in partly diminished fat of mesentery. On section, they were soft, light brownish, a few red spots in sinuses. Spleen, 2 x 10 x 45 cm; capsule, steel-blue, pulp firm and dry, dark brown in color; trabeculæ visible. Liver, small, distinct, orange-color. Blood in capillaries of liver, thin, otherwise no abnormalities. Portal lymph nodes, small, somewhat soft. Bile, greenish-yellow. Kidneys, small, capsules strip easily, whole organ of a typical reddish-brown color. Lungs, both lobes pinkish; on freshly cut surfaces, gray, along the lower margin several interstices filled with air. Bronchial and mediastinal lymph nodes, small, brownish. Trachea, mucous membrane pale and dry. Heart, flabby, the fat along the coronary sulcus exposed to the air becomes rapidly solid in both ventricles; small amount of coagulated blood. Myocardium solid and normal color. Submaxillary, retropharyngeal, mammary, thoracic and cervical lymph nodes, small and tough. Udder, state of half lactation; small amount of milk in ducts; surface granulated.

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[1] Norsk Veterinaer Tijdskrift, August–September, 1911, pp. 209 to 227.

Diagnosis: Enteritis and lymphadenitis: Paratuberculosis specifica.

Bacterioscopic Examination: Smears from the intestinal mucous membrane (ileum, cecum, colon and rectum): acid-fast bacilli, fairly numerous but not in clumps and clusters as they are usually found in this disease. Some forms are rather long, tubercle bacilli-like.

Microscopic Examination: Sections of the intestinal walls show typical epithelioidal and giant cell infiltration with clumps of acid-fast bacilli; preparations of the spleen show marked atrophic pulp filled with small and large clumps of pigment.

Transmission Experiments. (1) With material of the mesenteric lymph nodes: The mesenteric lymph nodes which were removed under aseptic conditions and contained microscopically numerous acid-fast bacilli, were ground with equal parts of saline solution. With the emulsion obtained the following animal was inoculated:

Bull calf (No. 2741), aged ninety-six days (born November 8, 1910). On February 12, 1911, injected intravenously with six c.c. For a few days the animal showed a slight rise in temperature. It developed properly in the first eight months, then became rather thin, rough-coated, and, since November, 1911, temporary diarrhea was observed. Microscopic examinations did not reveal acid-fast bacilli in the feces nor in the rectal scrapings. December 7, 1911, it was tested with avian tuberculin.[1] The result of the test was as follows:

On December 7, at 8.30 P.M., the calf received 1 c.c. of concentrated avian tuberculin in 3 c.c. carbolized saline solution injected under the skin. The following temperatures were shown:

3.00 P.M.	102.8°	5.30 A.M.	104.8°
5.00 P.M.	102.4°	7.30 A.M.	106.2°
8.00 P.M.	103.5°	9.30 A.M.	106.4°
8.30 P.M.	injection.	11.00 A.M.	106.3°
		1.00 P.M.	105.2°
		3.00 P.M.	104.5°

The animal reacted, therefore, according to this test to avian tuberculin. On February 2, 1912, the animal was tested with bovine tuberculin. The result was negative, as the following table will show:

On February 2, 1912, at nine o'clock, the calf received 0.3 c.c. tuberculin (H) subcutaneously, and showed the following temperatures:

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[1] I am indebted to Professor Bang, of Copenhagen, for the tested avian tuberculin.

4.00 P.M.	101.0°	5.15 A.M.	102.4°
5.30 P.M.	102.2°	7.00 A.M.	103.8°
8.30 P.M.	102.1°	9.00 A.M.	103.8°
9.00 P.M.	injection.	11.00 A.M.	103.3°
		1.00 P.M.	103.6°

Result: No reaction.

From February, 1912, the weight of the animal gradually decreased; and edema developed in the intramaxillary space. The attacks of diarrhea became more frequent and more pronounced in the month of May.

On May 14, another tuberculin test with avian tuberculin was carried out, but *the animal failed to react*, as is shown in the following table:

On May 14, 1912, the animals received 0.5 c.c. avian tuberculin[1] subcutaneously. The temperatures were as follows:

3.00 P.M.	103.0°	5.00 A.M.	102.0°
5.00 P.M.	103.4°	7.00 A.M.	102.3°
8.30 P.M.	102.8°	9.00 A.M.	102.8°
9.00 P.M.	injection.	11.00 A.M.	102.2°
		1.15 P.M.	102.8°
		3.15 P.M.	102.8°

Result: No reaction.

On May 18, 1912, and on May 25, 1912, respectively, the animal was tested with a 4 per cent. and an 8 per cent. ophthalmic tuberculin (human). Result: negative.

In June, 1912, a general anemia was very pronounced. Sixteen months after the infection the animal was killed.

Autopsy report of calf (No. 2741) June 22, 1912:

Carcass emaciated; subcutaneous fat tissue markedly reduced in quantity; in submaxillary space, yellowish, gelatinous edema. In abdominal cavity, about 50 c.c. clear, slightly yellowish fluid. Position of intestinal tract, normal. Duodenum, grayish; several loops of jejunum reddish-gray, slightly thickened. Ileum, marked increase in thickness in mucous membrane with irregular, longitudinal, and transverse folds; small hemorrhages on the crests of the folds, which could not be smoothed. Cecum and colon, slate colored, but not thickened. Rectum, apparently no alterations. Mesenteric lymph nodes are only slightly enlarged, soft; in the center, black pigmented, no cheesy areas, the follicles somewhat protruding. All the other organs are normal and free from tuberculosis.

Microscopic Examination: In ileum and caudal portion of jejunum, cecum, mesenteric lymph nodes, numerous acid-fast short bacilli.

Histologic Examination: Sections of the intestinal walls showed the usual proliferations of tuberculoid tissue elements with characteristic accumulation of acid-fast bacilli in these cells.

Several sections of the jejunum revealed, on the other hand, some interesting changes which had not, so far, been reported.

In the serosa (see Figs. 4 and 7) are seen by low power, several bloodvessels entirely surrounded and filled with epithelioidal connective tissue and giant cells. At high power and special staining for tubercle bacilli, it is evident that here a process similar to that in the mucosa and submucosa has established itself. The bloodvessels are entirely occluded by a proliferation of the intima and the perivascular lymph sheets by the above-named cellular elements. All the epithelioidal cells are blocked with acid-fast bacilli; in the lumen of the arterioles a small amount of pigment is found.

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[1] The same tuberculin used as on December 7, 1911.

These alterations just described may be classed in two ways:

(*a*) They are due to bacterial thrombi following the intravenous injection of infected material, localizing first in the lymph sheet of the bloodvessels; or

(*b*) They are lymphatic metastases of the inflammatory process in the mucosa, travelling along the vessels on their way to the mesenteric lymph nodes.

Which explanation is correct has to be decided by the study of further material. The writer is inclined to accept the first explanation, as he has not yet succeeded in observing these changes in many sections of the intestinal wall of naturally infected cases of paratuberculosis; the lesions in the lymph nodes and intestinal mucosa and submucosa were more pronounced in these sections than in the experimental case just discussed.

(2) With mucous membrane of the intestinal tract: The mucous membrane was carefully flushed with water, scraped off, and used for the following experiments:

(*a*) Bull calf (No. 2730), aged six and a half months (196 days). Fed in two doses with 1 kg. mixed with milk. This animal was tested with avian tuberculin twice, and once with bovine tuberculin, without giving reaction. It never showed diarrhea and is still kept under observation, but without indication of having contracted the disease by feeding.

(*b*) Six guinea-pigs (No. 3297) inoculated subcutaneously with a 20 per cent. emulsion of mucous membrane; 0.25 c.c. each, February 13, 1911.

Nos. 1, 2, 3 and 5 died in the course of a few days from coli septicemia.

Nos. 4 and 6 were killed eleven months after the inoculation, with entirely negative results.

(*c*) Three rabbits (No. 3296) injected subcutaneously 1 c.c. of same emulsion as above. No. 1 died August 30, 1911; showed marked emaciation; cheesy necrosis in mesenteric lymph nodes; acid-fast bacilli absent. No. 2 died July 7, 1911; anemia and cirrhosis of the liver; negative to acid-fast bacilli.

No. 3 killed November 8, 1912; absolutely negative.

(*d*) Two rabbits (No. 3295) 0.5 c.c. subcutaneously; were killed November 8, 1912, and found to be healthy.

Experiment No. 2

Jersey Cow No. 786. Clinical Observation: During the last eight months, the animal showed severe diarrhea; lost in condition and weight. The animal stood in one of the loose boxes in the dairy barn on the experimental farm, and was removed to the quarantine station March 1.

A clinical examination on April 30 reveals the following condition: The hair coat is rough and dull; the hind-legs, the abdomen, and tail are soiled with feces. Respiration, 22; pulse, 66 per minute; temperature, 101.6°. The auscultation and percussion of the thoracic walls reveal normal conditions. The muzzle is cool, moist. The rumen contracts twice in a minute. The peristalsis of the intestines is not affected. There is marked diarrhea. The feces are liquid, watery, brownish-yellow, spotted with small gas bubbles, and have an offensive odor. Milk secretion has entirely ceased. The urine is clear, acid reaction; no albumin and sugar are present. The animal was tested with bovine tuberculin and gave a negative reaction. In the feces as well as in the scrapings from the mucous membrane of the intestines, numerous acid-fast bacilli in clumps and clusters are demonstrated with and without the antiformin methods.

Autopsy Report of Cow No. 786: In the agonal stage the animal was killed on June 3, 1911. Carcass greatly emaciated. Anus soiled with feces. Subcutaneous and intermuscular tissue yellowish and pale. Muscles brick red in color and fairly dry. Blood is not very thin, and does not run freely from axillary artery, but coagulated well and quickly. The abdominal cavity presents a small quantity of fluid. Thoracic cavity shows no fluid. Peritoneum smooth and shiny. Anterior lobe of lung on both sides attached to pleura. Rumen presents small quantity of dry material. Mucous membrane normal. Reticulum and omasum show small quantity of dry material, similar to that found in the rumen. Abomasum almost empty but mucous membrane covered by greenish mucous. Surface of mucous membrane remarkably granular. The small intestines opened in patches (used for experiment) shows thickening of walls and mucous membrane, but not identically the same as seen in European cases. The mucous membrane shows contracted, irregular, longitudinal folds, with small diffuse hemorrhages.

Colon, cecum and rectum manifest a small quantity of liquid fetid-smelling contents. Mucous membrane thickened, and also demonstrates longitudinal stripes which are red in color. Mesenteric lymph nodes are swollen and lying in the diminished fat of the mesentery.

Mesentery lymph nodes on section are dark brown and soft, with lymph running from cut surface.

Spleen, 35 x 10 x 2 cm. Capsule whitish steel-blue in color. Pulp dry, firm and dark brown; trabeculæ visible. Liver and bile normal. Kidneys rather small with supracapsular fat disappearing.

Lungs, left anterior lobe adherent to the pleura. On section the cavities of the dilated bronchi manifest viscid mucous, yellow pus. Parenchymatous tissue presents several atelectatic and pneumonic areas. Heart is flabby, but otherwise normal. Other lymph nodes examined show only slight swelling and succulency. Udder atrophic with dry parenchyma. Supermammary lymph nodes normal.

Microscopic Examination: The microscopic examination of the mucous membrane of the intestines revealed acid-fast bacilli and their characteristic clumps in every part of the intestines with the exception of the abomasum. The quantity was remarkably increased in the end portions of the ileum and the cecum.

Histologic Examination: The usual infiltration in the mucosa, submucosa and mesenteric lymph nodes was found. In the rectum the processes are localized in some of the lymph follicles, or incipient proliferation is seen in a few villi of the mucosa. The conditions are similar to those described by the writer under the name of nodular, hypertrophic, enteritis specifica.

Bacteriologic Examination: Forty tubes of special egg media (prepared according to Twort) were inoculated with lymph node material, sealed with paraffin and incubated, June 4, 1911.

About 25 per cent. of the tubes were contaminated (for further details see later).

Material of the lymph nodes and mucous membrane was treated with antiformin, our intention being to determine the resistency of the organism toward this preparation. A part of it was also used for several serologic experiments with the Bordet-Gengou reaction.

(A) *Transmission Experiment with the Material of the Mesenteric Lymph Nodes.* The mesenteric lymph nodes, removed aseptically, contained on microscopic examination, numerous acid-fast bacilli.

The pulp, after being ground and diluted with saline solution to a 20 per cent. emulsion, was used for the following experiment:

(1) Bull calf (No. 2757), born March 2, 1911; aged ninety-two days; received intravenously, 10 c.c. The animal was castrated in September, and showed normal development until the beginning of January, 1912, when it developed diarrhea and its general condition became gradually disturbed.

The animal was tested on December 7, 1911, with avian tuberculin and reacted to the test. The results were as follows:

With 1 c.c. avian tuberculin, injected subcutaneously:

3.00 P.M.	102.7°	5.30 A.M.	103.0°
5.00 P.M.	103.0°	7.30 A.M.	104.4°
8.00 P.M.	102.1°	9.30 A.M.	104.4°
8.30 P.M.	injected.	11.00 A.M.	105.3°
		1.00 P.M.	104.6°
		3.00 P.M.	104.8°

Result: positive.

On February 2, 1912, the animal was tested with 0.4 c.c. bovine tuberculin:

Result: negative. February 3, 1912.

4.00 P.M.	102.2°	5.15 A.M.	101.6°
5.30 P.M.	102.4°	7.00 A.M.	102.8°
8.30 P.M.	101.2°	9.00 A.M.	102.4°
9.00 P.M.	injected.	11.00 A.M.	102.0°
		1.00 P.M.	102.2°

The general condition of the animal grew daily worse. The diarrhea, however, was only temporary. A marked edema developed along the dewlap and in the intermaxillary space. It was again tested with avian tuberculin on May 14, 1.5 c.c. avian tuberculin injected subcutaneously.

The animal failed to react, as shown in the following table:

3.00 P.M.	103.1°	5.00 A.M.	101.4°
5.00 P.M.	103.4°	7.00 A.M.	101.0°
8.30 P.M.	102.6°	9.00 A.M.	102.0°
9.00 P.M.	injected.	11.00 A.M.	102.4°
		1.15 P.M.	101.8°
		3.15 P.M.	102.2°

Result: no reaction.

Microscopic examinations of the feces and scrapings were always negative. From the middle of May the animal became so emaciated and weak that it was unable to rise. The anus was constantly open; the liquid feces running from the animal. On June 6, 1912, it died.

Autopsy Report (State No. 2757): Emaciation very much in evidence. Rigor mortis present in the region of the head; it passes to the region of the foreleg. Animal slightly bloated. Subcutaneous and intermuscular tissue very pale. Abdominal cavity: the serosa on the intestine along the mesentery showed distinct vascular injections. Fat tissue in the mesentery absent. Mesenteric lymph nodes enlarged, moist, 3 cm. in diameter. They vary in length, and are medullary in consistency.

The duodenum presents gray liquid contents. Mucous membrane is smooth in patches and considerably contracted. Jejunum contains liquid material. Mucous membrane slightly swollen; shows patches of bright, spotted areas and zones of gray color, in the middle resembling tigering. Ileum, velvet-like in consistency, not swollen. Whitish streaks and areas similar to those of the jejunum. Lymph nodes in the region of the ileocecal valve enlarged and soft. Cecum filled with greenish watery fluid. Mucous membrane manifests distinct ramifications of the bloodvessels and petechiation. No swelling present. Colon showed liquid contents. Mucous membrane presents areas of distinct ramifications. Swelling not very distinct. Rectum showed liquid contents. Mucous membrane contained marked vascular ramifications. Lymph nodes at the fourth stomach distinctly swollen. Abomasum presents liquid green contents, while the folds of the mucous membrane are remarkably œdematous and gelatinous. Pylorus richly decorated with petechia and ecchymoses. Omasum showed fairly dry contents. Rumen and reticulum showed liquid contents. Spleen 25 x 9 cm. is contracted; capsules shriveled; on sections trabeculæ are distinct; pulpy, dark, reddish brown. Liver capsule is smooth. Parenchyma normal in color, light-colored rectangular areas, consistency normal. Gall-bladder enlarged. Bile light yellowish-brown and very viscid. Mucous membrane covered with a small amount of mucus. Portal lymph nodes small. Perirenal fat gelatinous, bile-stained. Kidneys: parenchyma rather pale, otherwise normal, organ-colored. Lungs are partially in inspirium; the pleura is filled and pale on the diaphragmatic lobe; trachea and bronchi contain a whitish foam; mediastinal and bronchial lymph nodes normal. Heart: pericardium showed a few drops of sanguinolent fluid. Right ventricle presents a small amount of liquid blood and a well-formed clot. Left ventricle and left auricle, same condition. Valves normal. Myocardium, pale and soft, showed vascular injections on the surface. Fat on the coronary arteries is solid. Prescapular and precrural lymph nodes small. Left femur bone-marrow is light, brownish-yellow in color in center; gelatinous red areas in form of streaks and bands in both epiphyses.

Diagnosis: Severe catarrhal enteritis, œdema of the abomasum. Lymphadenitis of the mesenteric lymph nodes. Atrophy of the spleen. Anemia; emaciation. Lung edema; slight degeneration of the myocardium. Circumscribed degeneration of the liver, reversion to the embryonic type of bone-marrow at the epiphyses of the long bones. Paratuberculosis specifica.

Microscopic Examination: The microscopic examination reveals acid-fast bacilli in the duodenum, ileum and cecum.

Histologic Examination: The usual findings of proliferation extending over the serosa.

Bacteriologic Examination: Cultures made on different culture media containing tubercle bacilli extracts. (See later, page 898.)

(2) Bull calf (No. 2751), aged about seven and one-half months; received 10 c.c. of emulsion intravenously.

The animal developed properly; never showed any diarrhea; lost somewhat in weight during February and March, 1912. Was tested with avian tuberculin December 7, and gave a positive reaction. The temperatures obtained were as follows:

Inoculated with 1 c.c. avian tuberculin; injected subcutaneously:

3.00 P.M.	102.2°	5.30 A.M.	101.3°
5.00 P.M.	102.4°	7.30 A.M.	102.6°
8.00 P.M.	103.0°	9.30 A.M.	103.0°
8.30 P.M.	injected.	11.00 A.M.	104.4°
		1.00 P.M.	105.4°
		3.00 P.M.	105.6°

Reaction: positive.

The animal was tested with bovine tuberculin 0.5 c.c. subcutaneously, February 2, 1912. The temperatures obtained were the following:

4.00 P.M.	101.4°	5.15 A.M.	101.8°
5.30 P.M.	101.8°	7.00 A.M.	102.0°
8.30 P.M.	102.0°	9.00 A.M.	103.0°
9.00 P.M.	injected.	11.00 A.M.	103.1°
		1.00 P.M.	103.0°

Result: no reaction.

The animal was tested again with avian tuberculin May 14, 1912. Was inoculated subcutaneously with 1.5 c.c. avian tuberculin:

3.00 P.M.	102.4°	5.00 A.M.	100.0°
5.00 P.M.	102.8°	7.00 A.M.	101.0°
8.30 P.M.	102.6°	9.00 A.M.	101.8°
9.00 P.M.	injected.	11.00 A.M.	101.8°
		1.15 P.M.	101.3°
		3.15 P.M.	101.0°

Result: no reaction.

Microscopic Examination: The microscopic examination of the feces and of the rectal lining never showed any acid-fast bacilli characteristic for paratuberculosis.

In July, 1912, the animal showed signs of emaciation, and inasmuch as it had reacted to the avian tuberculin it was considered to be affected with paratuberculosis and was killed July 17, 1912.

Autopsy Report: Carcass anemic and emaciated. In the abdominal cavity, a few drops of liquid. There were no alterations in the position of the intestinal tract, nor were the walls of the duodenum, ileum, jejunum, cecum or colon in any way changed. Some areas of the mucous membrane were slightly reddened. The mesenteric lymph nodes were enlarged and soft on section, pigmented; no signs of tuberculosis found after a careful examination of all the organs.

Microscopic Examination: A most careful microscopic examination of every part of the intestinal tract, with and without the antiformin method, *failed to demonstrate the specific acid-fast bacilli*. Also the mesenteric lymph nodes, with the exception of one, did not contain the specific acid fast bacilli. In one gland, two or three organisms resembling the bacillus paratuberculosis were seen, but their number and their staining reaction were not absolutely convincing. Considering the clinical symptoms and allergic reactions, the animal was undoubtedly affected with paratuberculosis.

The microscopic examination cannot be considered as absolutely conclusive, as it is for technical reasons impossible to examine every inch of the mucous membrane. The findings on the mesenteric lymph node point strongly to the conclusions stated above.

This observation shows further, if such deductions are permissible, that neither the anatomical lesions nor the quantity of the bacteria are responsible for the emaciation of the animal, but that probably toxins produced by the latent organisms should be suspected as being the causative agents of the wasting. The view that toxins are responsible for the death in paratuberculosis has been advanced by Bang and Pearson. Similar symptoms of emaciation are seen following the injection of human tubercle bacilli in calves.

(B) *Transmission Experiment with the Mucous Membrane of the Intestinal Tract:*

(1) Bull (No. 2724), aged 353 days, was fed with scrapings from the intestinal tract as follows:

June 6, 1911. Fed with 125 gm. mucous membrane of jejunum and ileum of Cow No. 786, somewhat diluted with normal saline solution, given as a drench in a pint of milk. Microscopic examination shows bacilli rather scarce, about six in a field.

June 7, 1911. Fed 125 gm. of above material, in the same manner as described above. Microscopic examination shows bacilli scarce and hard to locate.

June 8, 1911. Fed 125 gm. of same mixture, in same manner as above. Microscopic examination. Bacilli not very plentiful.

July 6, 1911. Animal doing finely.

This animal developed absolutely normally in general condition and weight. Was tested with avian tuberculin December 7, 1911, and May 14, 1912, and gave a negative reaction. Was tested with bovine tuberculin February 2, 1912, and gave also a negative reaction.

To determine whether this animal was affected "latent," it was killed on July 12, 1912, at the slaughter-house of D. B. M.

Autopsy Report: The examination revealed only normal conditions. A careful microscopic examination of the intestinal tract and of the mesenteric lymph nodes revealed no acid-fast bacilli.

(2) Bull (No. 2725), aged 154 days, was fed with material as follows:

June 6, 1911, with 125 gm. of mucous membrane of jejunum, and ileum of Cow No. 786, somewhat diluted in normal saline solution, given as a drench in a pint of milk. Microscopic examination. Bacilli quite plentiful.

June 7, 1911. Fed with 125 gm. of mixture prepared in same way as above and given in same manner. Microscopic examination: Bacilli rather scarce.

June 8, 1911. Fed 125 gm. of mixture prepared in same way as above and given in same manner. Microscopic examination: Bacilli very scarce and difficult to locate.

July 6, 1911. Animal has put on weight and appears to be in first-class condition.

The animal developed properly and did not show any clinical changes. Was tested with avian tuberculin on December 7, 1911, and on May 14, 1912, and gave a negative reaction. Was tested with bovine tuberculin on February 2, 1912, with negative results.

This animal is still kept under observation.

Transmission Experiment No. 1. The present literature on paratuberculosis does not record any inoculation experiments with the second generation. An experiment with the intestinal material of Bull calf 2741 was, therefore, conducted by selecting young animals of different species and infecting them by the intravenous method; one calf was fed with scrapings.

(*a*) The mucous membrane, after being carefully washed with water, was emulsified with saline and a 20 per cent. solution prepared. The following animals were inoculated:

Calf (No. 57): Age about one month. Was inoculated with 10 c.c. intravenously on June 22, 1912. This animal developed properly. Was tested on April 9, 1913, with avian tuberculin without giving a reaction. The temperatures recorded were as follows:

5.00 P.M.	101.2°	7.00 A.M.	101.0°
7.00 P.M.	101.3°	9.00 A.M.	101.0°
9.00 P.M.	101.2°	11.00 A.M.	101.3°
11.00 P.M.	101.3°	1.00 P.M.	101.2°
11.10 P.M.	injected.[1]	3.00 P.M.	102.0°
		5.00 P.M.	101.8°
		7.00 P.M.	101.8°

Result: negative.

The animal was, June, 1913, in perfect condition, never showed signs of diarrhea or wasting. Clinically it was considered to be free from the disease. To prove this presumption it was killed on June 20, 1913.

Autopsy Report. Carcass in very good condition. No alterations in the position of the intestinal tract. The entire jejunum and ileum *extremely* thickened, the wall hard and rigid. The mesenteric lymph-vessels *very* markedly bulging over the surface of the roughened serosa; filled with lymph. On section, the mucous membrane is folded and slightly corrugated. Some of the crests of the intestinal mucous membrane show diffuse hemorrhages. The folds cannot be stretched out. Colon, soft contents. Other organs apparently normal. Mesenteric lymph nodes enlarged, on sections soft and watery.

Microscopic Examination: The microscopic examination reveals an abundance of acid-fast bacilli in the macroscopic affected parts of the jejunum and ileum and mesenteric lymph nodes.

Histologic Examination: The usual infiltrations of epithelioid, giant and connective tissue cells are seen. All these elements show the acid-fast bacilli in abundance.

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[1] From this test, avian tuberculin prepared from our own strains was used. (See later.)

In the serosa some of the blood and lymph vessels are filled with the types of cells mixed with lymphocytes in the same manner as has been reported from the other cases. Giant cells are more prevalent than in case 2741. These findings will be more thoroughly investigated and reported elsewhere.

Bacteriologic Examination: Cultures were prepared on tuberculin agar.

Lamb (No. 58), aged two months. Inoculated with 5 c.c. intravenously, on June 22, 1912. This animal is developing properly. Was tested April 9, 1913, with avian tuberculin, 1 c.c., subcutaneously, and gave a positive reaction. The temperatures recorded were as follows:

5.00 P.M.	103.1°	7.00 A.M.	106.0°
7.00 P.M.	103.2°	9.00 A.M.	107.4°
9.00 P.M.	103.2°	11.00 A.M.	107.2°
11.00 P.M.	103.2°	1.00 P.M.	107.2°
11.10 P.M.	injected.[1]	3.00 P.M.	107.5°
		5.00 P.M.	106.6°
		7.00 P.M.	104.6°

Result: Positive. This animal was killed on May 21, 1913.

Autopsy Report: Sheep, fourteen months old, about 70 pounds; fairly good condition; fat tissue well developed; little fluid in abdominal cavity. No discoloration of intestines. Jejunum distinctly thickened and rigid, where opened. Mucous membrane folded, several patches reddened and covered by a small amount of chyme. All lymph nodes enlarged, soft, and pigmented. Colon and rectum, dry feces in form of small balls; cecum somewhat liquid contents. All the other organs apparently normal.

Microscopic Examination: A most thorough and careful examination with and without the antiformin, by my assistant Dr. Dinwoodie and myself, failed to reveal the acid-fast bacilli in great numbers. In several preparations from antiformin material about 4 to 5 rods were found to resemble closely the B. paratuberculosis.

Epicrisis: This probably is also a latent case similar to that mentioned above.

Goat (mother) No. 59: Inoculated with 10 c.c., intravenously. This animal developed properly and has not reacted so far to the avian tuberculin.

Autopsy: On June 16, 1913, revealed only a slight swelling of the lymph node of the ileum. Other organs apparently normal.

Microscopic Examination: Typical acid-fast bacilli were found in small numbers in scrapings from the mucous membrane in the neighborhood of the cecal valve.

Goat (kid), aged half month. Inoculated with 5 c.c. intravenously. This animal is developing properly. Did not react to avian tuberculin.

This animal is still kept under observation.

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[1] For this test, avian tuberculin prepared from our own strains was used. (See later.)

(*b*) Scrapings of the mucous membranes, in the amount of two pounds, were fed, mixed with milk, to the following animal.

Calf (No. 55), age two and a half weeks. This animal developed properly, but died overnight October 9, 1912, on account of acute meteorism.

Autopsy: General congestion of the lungs; intestinal tract normal. Microscopic examination proved entirely negative. No acid-fast bacilli were found in the mucous membrane or the mesenteric lymph nodes.

SUMMARY

Experiment No. 1. By intravenous injection of an emulsion made from the intestinal mucous membrane of Bull calf No. 2741, *a young calf was successfully infected* with paratuberculosis material (in second generation). The anatomical lesions were extremely pronounced, and no clinical symptoms were recorded. *The avian tuberculin test applied two and a half months before failed to indicate the presence of the disease.* Further experiments have to demonstrate if successive passage through bovines has any influence on the pathogenicity of the B. paratuberculosis. Unfortunately a calf fed with intestinal scrapings died (accidentally). A lamb, also intravenously injected, was unfortunately killed at a time when the anatomical lesions were not very marked, and the B. paratuberculosis could only be found with difficulty. A goat infected in a similar manner did not contract the disease; a goat-kid is still kept under observation.

In considering the pronounced anatomical lesions, and the absence of any clinical symptoms, the question arises as to whether these facts are *constant in the second generation*, or whether they are accidental. Some observations in Switzerland, where the disease is enzoötic, and where animals undoubtedly became infected by contact, seem to warrant further detailed examinations of this point. I remember several cases with similar pronounced anatomical lesions, and absence of any clinical symptoms, as seen in the case under discussion. Is it possible that the B. paratuberculosis has become purely saprophytic?

Experiment No. 2. With scrapings of the intestinal tract and small pieces of the mesenteric lymph nodes of cow No. IV,[1] several guinea-pigs (3727–3728) and rabbitts (3732–33) were inoculated intraperitoneally, and several rats (3729–30) were fed.

The autopsy of all these animals, which were killed from six to twenty months, revealed only negative findings.

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[1] The autopsies of these animals were absolutely typical and no lesions of tuberculosis were found (see table on page 893.)

Conclusions from Experiment No. 3. Similar inoculations with intestinal material and mesenteric lymph nodes were made on guinea-pigs, pigeons and chickens with the organs of heifer No. VII.[1] The result was entirely negative.

Observation of a Case of Paratuberculosis in a ten-months-old heifer. Clinical History: Imported in March, 1912. Previous to November 8, heifer was in good, healthy condition. Symptoms: Loss of appetite, profuse diarrhea, temperature normal (as far as I remember between 99° and 100°). Hair standing, rough-looking animal, falling away rapidly. After a week's time unable to raise itself; unable to stand. Died November 18. Treatment: In the beginning a mild laxative, 4 ounces oleum ricini and creolin half dram; repeated six hours later. After this, treatment with styptics. Bismuth subnitrate, tincture opium, catechu, flo. krameria, and finally during the last three days sulphocarbolates of zinc. As the heifer refused to eat, it was drenched three times a day with a quart of warm milk, two eggs, and a few tablespoonfuls of whisky. Not one of the styptics stopped the diarrhea.

Autopsy, November 7, 1912: Carcass in fairly good condition; the entire intestinal tract filled with only a small amount of greenish contents; walls contracted, mucous membrane thickened and folded, at several places slightly corrugated, hemorrhagic streaks and slate-colored areas. Mesenteric lymph nodes swollen, on section soft and moist. Fourth stomach slight edema of the folds. Other organs pale and anemic. Spleen atrophic and dry, brownish on sections.

Microscopic Examination: In smears from intestinal mucous membranes, acid-fast bacilli in abundance.

Conclusions from the Transmission Experiments

During the last two years altogether eight animals have been examined and carefully studied. The cattle were kept under observation on the farm of the Pennsylvania State Live-stock Sanitary Board. They were either killed or died a natural death.

The autopsy findings of all the animals examined are briefly summarized in the table below:

Cow I (Jersey C. F.). Paratuberculosis (K).[2]

Cow II (Jersey 786). Paratuberculosis (K).

Cow III (Jersey 802). Paratuberculosis. Tuberculosis of the lungs, mediastinal, bronchial and mesenteric lymph nodes (D).[3]

Cow IV (Jersey D). Paratuberculosis (K).

Cow V. (Jersey E). Paratuberculosis (D).

Cow VI (Guernsey V). Paratuberculosis (D).

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[1] The autopsies of these animals were absolutely typical and no lesions of tuberculosis were found. (See table on page 893.)

[2] K means killed.

[3] D means died.

Heifer VII (Guernsey ten months old). Paratuberculosis (D).

Bull (Jersey C). Paratuberculosis. Tuberculosis of the lungs, bronchial, mediastinal and mesenteric lymph nodes (K).

Several specimens of intestinal tract were also received during this time.

The clinical symptoms were identical with those described by the different investigators. The morbid anatomy was demonstrated by the well-known lesions, but the writer did not observe the same increase of thickness of the mucous membrane of the intestinal tract as he reported from his cases in Switzerland. A more or less marked edema of the abomasum was found in about 40 per cent. of the cases; the atrophy of the spleen, with a brownish dry appearance of the pulp, was always present. The microscopic examination revealed clumps of pigment in often large amounts. These observations confirm the statements of Bang, who first called attention to this pathological change. The treatment was always unsuccessful, and in 50 per cent. of the cases the animals succumbed to the disease.

With the scrapings of the intestinal tract and the mesenteric lymph nodes, numerous guinea-pigs, rabbits, pigeons, and rats were infected either subcutaneously, intraperitoneally, or per os. All these animals remained (under observation for a period of from six to twenty-four months) absolutely well. With organs of the cattle (III, V, VI, VII, and VIII) no transmission experiments were made. The experiments on calves are briefly summarized in the table below:

Origin of material for transmission	Material	Mode of infection	No. of anim'l	Date of injection	Date of autopsy	Autopsy findings	Culture
Cow No. I	Mesenteric lymph nodes	Intravenous	2741	Feb. 12, 1911	June 22, 1912	Paratuberculosis	
Cow No. I	M.m. of intestines	Fed	2730	Feb. 12, 1911	Still under observation		
Cow No. II	Mesenteric lymph nodes	Intravenous	2757	June 3, 1911	Died June 12, 1912	Paratuberculosis	Positive
Cow No. II	Mesenteric lymph nodes	Intravenous	2751	June 3, 1911	July 17, 1912	Paratuberculosis	
Cow No. II	M.m. of intestines	Fed	2724	June 3–8, 1911	July 12, 1912	Negative	
Cow No. II	M.m. of intestines	Fed	2725	June 3–8, 1911	Still under observation		
Bull calf 2741	M.m. of intestinal tract	Intravenous	57	June 22, 1912			
Bull calf 2741	M.m. of intestinal tract	Fed	55	June 22, 1912	Died Oct. 9, 1912	Acute meteorism	

According to the above statement, out of two calves infected with material from cow No. I, in one only was the experiment successful. A young calf injected intravenously contracted paratuberculosis. From the calves infected with material from cow No. II only two animals became infected with the disease; both being infected by the intravenous method. The lesions and the bacteriologic findings in one of the calves were only slight, a fact which is explained partially by the chronic, slow course of disease, which may cause in the period the animal was under observation but slight anatomical lesions which are readily overlooked.

All the feeding experiments were unsuccessful. This result cannot be explained by the virulency of the organism used, as in both experiments extremely small quantities of infectious material produced the disease when inoculated intravenously. More readily can the susceptibility of the animals be considered as of importance, namely, that *only calves in the first three to four months of life are susceptible:*

So far all the transmission experiments by Bang,[1] Miessner and Trapp,[2] Malm,[3] Holth,[4] and Twort and Ingram[5] have been conducted on calves. For the first time, as far as I can determine in the literature, yearlings or older animals were used. For this reason the results have, in my opinion, a far-reaching importance, which will be discussed later in more detail.

Miessner and Trapp were the only investigators reporting failures with the primary animal inoculations; their explanation cannot be applied to my experiments, as their animals were not kept under observation for a sufficiently long period.

The inoculations with material from one of the experimental animals (Bull calf 2741), in second generation, was again successful by the intravenous method in a one-month-old calf; also a lamb was infected by the same method, but unfortunately autopsied before the anatomical lesions had distinctly developed. A transmission experiment on an old goat was negative. A young calf fed with intestinal material died accidentally.

We have not, so far, been successful in transmitting paratuberculosis to sheep, or to goats. This transmission experiment was made to prove the findings of Stockman,[1] Malm,[2] Twort and Ingram,[3] who have infected goats, and M'Fadyean, who found an intestinal affection similar to paratuberculosis in a deer.

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[1] Loc. cit. [2] Loc. cit. [3] Loc cit.

[4] Zeitschrift f. Infektionskrankheiten, parasitare Krankheiten und Hygiene der Haustiere, 1912, Bd. xi, Heft 5, p. 378, 387.

[5] Vet. Record, September 14, 1912.

THE NATURAL INFECTION

All the investigators of paratuberculosis came to the conclusion that the malady is an infectious disease, and, based on the first successful feeding experiments of Bang, considered the natural infection to take place by the intestinal tract. As the diseased animals eliminate the specific organisms in tremendous quantities, they soil their surroundings, and give other animals an opportunity to infect themselves. These deductions are for many cases somewhat contradictory to the results generally obtained by the examination of feces, as by most extensive microscopic examination one rarely can find many bacilli; but we have pointed out that frequently small, mucous clumps are seen in the feces and that said particles contain usually the specific organisms in abundance.

From observations in Switzerland, I deducted that the infection takes place frequently in the pasture. O. Bang[4] cites an instance where young animals came in contact on the pasture, with old, infected animals, and consequently 4 out of 58 yearlings contracted the disease. He considers the infection to take place in the stable and on the pasture as well. I coincide with his view, based on the observations made in Pennsylvania.

Miessner and Trapp[5] only observed infection in animals which were kept permanently in the stable. For this reason they deny absolutely the possibility of an infection by pasturing. The epidemiological observations made by Bang seem to prove these statements, namely, in three herds, mostly adult animals were affected (10 per cent. to 33 per cent.). Among the young stock, which was frequently kept on pasturage, only 6.8 per cent. of the animals were infected. Bugge and Cordsen[6] recognized the disease in herds which were kept in the stable and on pasture.

If these are the actual conditions, then the mature animals would be more apt to contract the disease than the young stock, probably on account of the manner of cohabitation and confinement in one stable, whereas the young animals, which are usually kept separate from the cows which eliminate the bacteria, have fewer chances to take up the infection.

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[1] Jour. Comp. Path. and Therap., 1911, xxiv, p. 66.

[2] Literature cited.

[3] Literature cited.

[4] Centralbl. f. Bakt., etc., 1909, I Abt., originale, Bd. li, Heft 4, p. 450.

[5] Loc. cit.

[6] Zeitsch. f. Infektionskrankheiten, parasitare Krankheiten und Hygiene der Haustiere, 1908, Bd. v, S. 133.

Quite a different view has been advanced by Malm[1] through his studies of the Laalland's disease[2] in Norway. In his opinion the B. paratuberculosis is not a strictly contagious parasite which can only be transmitted from animal to animal or by intermediate carriers like insects. Probably the bacillus vegetates outside of the animal body in the manure, stable, or on certain pastures and plants. This B. paratuberculosis enters only the intestinal walls, is filtered off by the mesenteric lymph nodes, but never invades any other organs. He found old and young animals, but in most cases cattle at the age of from five to eight years affected.

The view of Malm is, in the writer's opinion, very important for consideration and further investigation. As stated, our observations in Switzerland proved that the disease is absolutely connected with certain pastures, and they support his views in many directions. The close relationship of the B. phlei to B. paratuberculosis is another connecting link which will, perhaps in the near future, permit the deduction that the paratuberculosis of bovines is due to a parasitic grass bacillus.

Our observations during the experiments of artificial transmission have shown that old animals undoubtedly have considerable resistancy against a feeding infection. As shown in the records given above, only three calves, at the ages of 30, 93 and 96 days, contracted the disease. On the other hand feeding experiments with large doses of material on animals of from six months to a year remained unsuccessful.

All the experiments of other investigators have been carried out on calves (what age?) and no experimental data are available to decide if our observations are the rule.

To test the channels of infection under natural conditions the following experiment was conducted.

For the last two years a cow with her two calves were kept in a quarantine building (12 feet x 12 feet) and adjacent exercise-yard.

These 3 animals had previously been exposed by my prede-

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[1] Loc cit.

[2] Laalland's disease, Norwegian name for paratuberculosis.

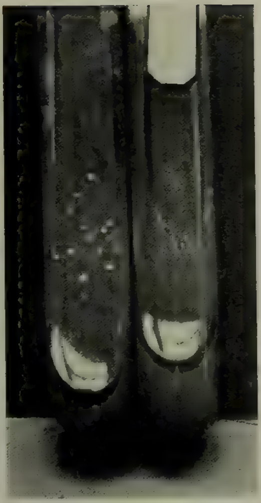


FIG. 1.—Primary culture on tuberculin serum agar, eighteen weeks' incubation left tube, eight and a half weeks right tube at 38° C.

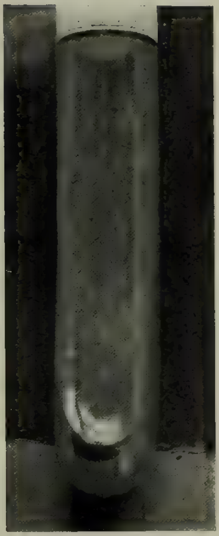


FIG. 2.—Primary culture on serum agar with glycerin extract of human tubercle bacilli. Eight and a half weeks' incubation at 38° C.

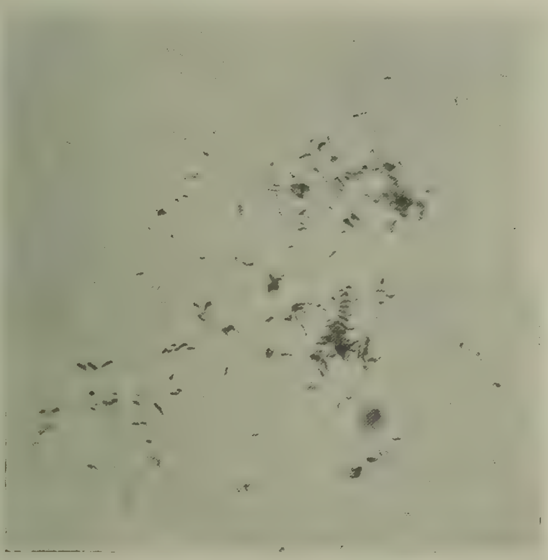


FIG. 3.—B. paratuberculosis from second subculture on tuberculin serum agar. Ziehl-Neelsen stain (× 1850).

Fig 4

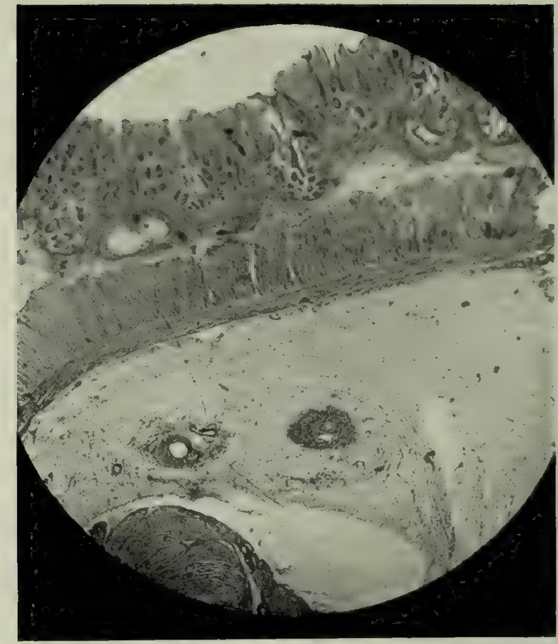


Fig. 5

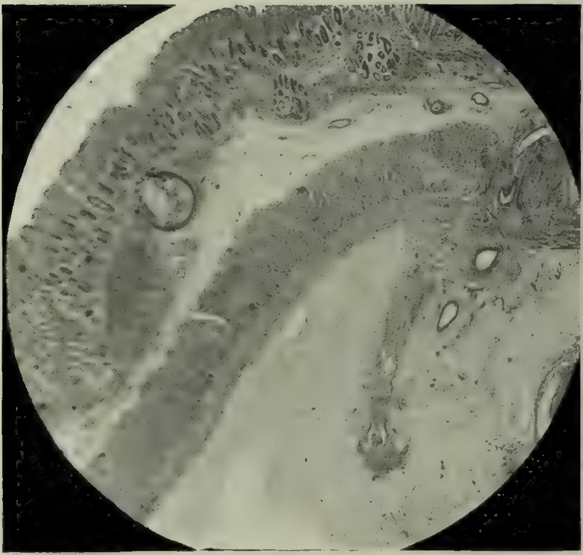


FIG. 6

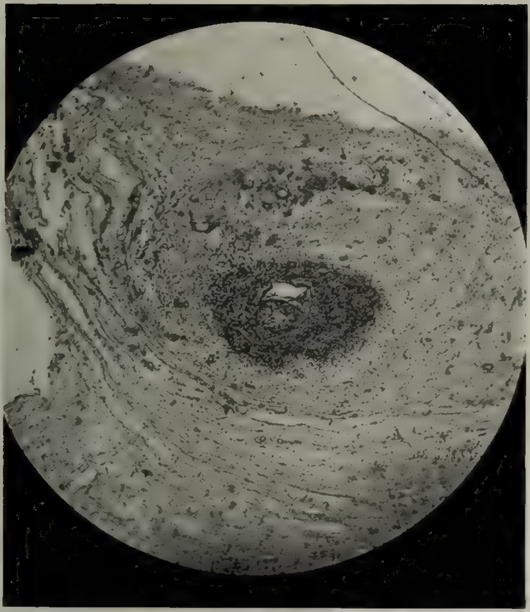
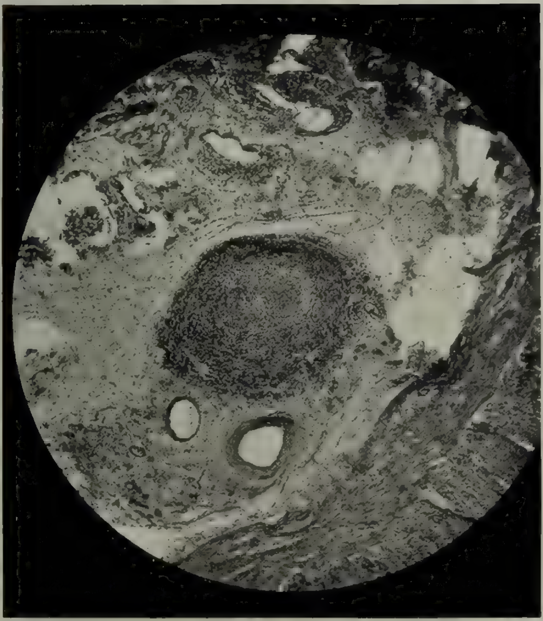


FIG. 7



FIGS. 4 to 7.—Sections of the intestinal wall of bull calf 2741.

cessor,[1] Dr. Deubler, to an animal badly infected with paratuberculosis. Since that time, different paratuberculous animals (786 and 802, Jersey cow E) have constantly been in contact with the 3 animals in question.[2] The manure was left untouched in the stable, as well as in the exercise-yard, and as animals (786 and 802) were kept there, which eliminated the bacteria in such quantities that they could be demonstrated microscopically, no question exists but that these 3 animals were exposed to a severe infection. The calves, as well as the mother, were several times tested with avian tuberculin without giving any reaction. Assuming, from the general experiences, that pregnancy or intercurrent diseases frequently cause the development of clinical symptoms, the heifer was bred and infected with infectious abortion. The bull was castrated, but without result. Both animals were recently killed, and a most thorough examination of the intestinal tract failed to reveal signs of infection. This experiment can, therefore, be considered as negative.

In my opinion, based on these few observations, the contact infection takes place in the early days of life, and is particularly due to the close contact of the calf with the infected mother. The absence of clinical symptoms over a long period can certainly not be used as an argument against this theory, since we know that the latency of acid-fast bacilli in the animal body is one of their most important characteristics.

The disease may remain latent for a long time without showing external symptoms and still the infection has been contracted in the early days of life.

The long incubation time is usually broken by pregnancy and the pathological process accelerated at the time the milk secretion sets in. This same view has been expressed by Miessner and Kohlstock[3] based on one observation—a calf had actually contracted the disease by being in contact with its diseased mother. The animal developed normally for one and one-half years. When two years old, diarrhea developed for the first time. The postmortem of the animal, at the age of two and one-half years, showed the characteristic lesions of paratuberculosis. Clark[4] has a similar view concerning the infection.

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[1] See Annual Report of the Department of Agriculture of Pa., 1909.

[2] I may state here that the two calves of the cow above mentioned were older than eight months (heifer, two years; bull, ten months) when exposed.

[3] Berliner Tierärztliche Woch., 1912, No. 25.

[4] Loc. cit.

Summarizing our present knowledge concerning the natural infection we find that:

(*a*) Contact infection of calves in the early days of life has been observed, and, moreover, the transmission experiments conducted by us support the view that this mode of infection occurs probably more frequently than expected. For a satisfactory and successful eradication of the disease it is absolutely essential that newly born calves be isolated immediately after birth from the contaminated surroundings of a stable in which several animals suffering from paratuberculosis are standing.

(*b*) Another mode of infection, than purely contact, is suspected and further investigations into the biology of the B. paratuberculosis outside the animal body are extremely necessary. The possibility of an infection on certain pastures cannot be denied.

CULTIVATION OF THE B. PARATUBERCULOSIS

All investigators of paratuberculous enteritis reported, previous to 1910, that they had not been successful in cultivating the specific organism outside of the body. In 1908 claims were brought forward by Bugge and Albien[1] that they had succeeded in cultivating the bacillus from the mesenteric lymph nodes. In 1910 Albien[2] stated, in a separate publication, that he eventually succeeded in obtaining cultures by using glycerin agar (containing a small amount of Nahrstoff, Heyden). Out of several hundred tubes inoculated, only eight showed a satisfactory growth.

Mohler[3] reports the growth of an acid-fast bacillus on Dorset's egg media in the form of a raised colony. Unfortunately, this culture was contaminated, and further attempts on various culture media failed to give satisfactory results.

These observations are similar to those made by the writer in 1908, namely: Some glycerin serum tubes showed, several months after inoculation, the seed material unaltered. In many instances, an apparent increase in the number of the bacilli was noted. I had also used Hesse's "Heyden" agar, but without success.

Koch and Lydia Rabinowitch[4] reported that Stuurmann[5] succeeded in isolating from a cow suffering from paratuberculosis an acid-fast bacillus which they declared to be identical with the avian tubercle bacillus.

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[1] Berliner Tierärztliche Woch., 1908, S. 175.

[2] Ibid., October, 1910, p. 193.

[3] Literature cited.

[4] Virchow's Archiv, 1907 Band, Beiheft zum 190, p. 475.

[5] Official Report of the Ninth International Veterinary Congress, Hague, September, 1909, pp. iii, i, 6.

Mettam, and later Miessner, have also isolated a bacillus which in every respect corresponds with the avian tubercle bacillus. These findings were probably purely accidental.

In 1910 and later, in a more complete report, F. W. Twort and Ingram[1] stated before the Royal Society that they had succeeded in isolating the bacillus of paratuberculosis from four cases. The culture media used was Dorset's egg medium, to which dead tubercle bacilli had been added. In 1912, Holth[2] reported, from Denmark, that he succeeded in isolating and cultivating the bacillus of paratuberculosis from two cases, on culture media, containing glycerin extracts of tubercle bacilli or other acid-fast bacilli (B. phlei). The writer reported and demonstrated before the Pathological Society of Philadelphia in October, 1912, the successful cultivation of the Bacillus paratuberculosis, from two cases, in America, on culture media containing extracts of human tubercle bacilli.

Soon after these communications to the Pathological Society, the publication of M'Fadyean, Sheather and Edwards[3] on Johne's disease appeared, in which the authors mentioned that they have isolated the bacillus of paratuberculosis from 27 cases, on culture media containing extracts of tubercle bacilli.

Dr. Twort has kindly supplied to us for comparison a culture of the organism isolated by him (September 3, 1912). In return we sent him a culture which he acknowledged to have received September 16, 1912. We have also supplied Dr. Mohler and Dr. Veranus A. Moore with cultures isolated from cases in America.

Our attempts[4] to cultivate the bacillus of paratuberculosis date back as far as June, 1911, when over forty tubes of Twort's egg media were inoculated with material from the mesenteric lymph nodes and from the intestinal tract, prepared in a similar manner as described in my publication of 1908, and also by the antiformin method. This latter point will be discussed more in detail.

We were unable to obtain "ericoline," as recommended by Twort[5] to be used in a 2 per cent. aqueous solution to destroy the accidental contaminators and therefore made use of the antiformin, with which we had previously experimented, and demonstrated that the organisms remained microscopically intact when exposed to this preparation for twenty-four to forty-eight hours. From comparative work with the tubercle bacillus, which has recently been confirmed by Schmidt and Protscher,[1] it appeared to us to be advisable to investigate whether an exposure of the paratuberculosis to antiformin is detrimental or destructive to such an extent that cultivation outside of the body could still be expected. We experimented, therefore, with 5, 10, 15, 20 and 25 per cent. solutions, and found that an exposure of half an hour to a 15 per cent. or to a 20 per cent. solution was sufficient to destroy the contaminators, but in our first experiment only an unsatisfactory growth on Twort's egg media was obtained in a few uncontaminated tubes; where the seed material had not been treated with antiformin, the rest of the tubes inoculated with antiformin material remained absolutely sterile.

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[1] Proc. Royal Society, B, vol. lxxxiv.

[2] Literature cited.

[3] Jour. Comp. Path. and Therap., September, 1912, xxv, Part 3, pp. 217, 275.

[4] In this work I have been faithfully assisted by Drs. Dinwoodie and Boerner.

[5] Proc. Royal Society, B, vol. lxxxi, read March 4, 1909.

Somewhat better results were obtained in December, 1911, when, aside from Twort's medium, about twelve different other media, commonly used for the isolation of the tubercle bacillus, were inoculated.

Two tubes of Dorset's egg media showed, after four and one-half months' exposure, a few minute colonies which proved microscopically to be indistinguishable from the Bacillus paratuberculosis.

Since June, 1912, more material was available for the attempts of cultivation.

We have used the material from two experimental cases and from four spontaneously affected cases, and have so far succeeded in obtaining a culture from five cases.

The culture media used consisted of ordinary serum agar, to which 2 per cent. dead tubercle bacilli and 4 per cent. glycerin had been added. Also, a 5 per cent. glycerin extract from tubercle bacilli, added to horse or ox serum, according to the methods of Holth, gave very satisfactory results. With the naked eye small, roundish, whitish colonies (Fig. 2) with a smooth, and later on with a slightly wrinkled surface, were noted after six to eight weeks' incubation. Subcultures on glycerin serum agar gave, in a shorter time, a more luxuriant growth. Usually some isolated colonies grew larger than others (Fig. 1). Such colonies are clumpy, brittle, they are easily detached from the surface of the medium, but do not smear out properly. This observation stands in correlation with those of M'Fadyean and others, and we quite agree with their views that the tendency to develop large colonies belongs to the normal character of the Bacillus paratuberculosis.

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[1] Zeitsch. f. Infektionskrankheiten, parasitare Krankheiten und Hygiene der Haustiere, 1912, Bd. xi, Heft 5 und 6.

Solid Media. All the solid culture media, containing an extract of tubercle bacilli, do not seem to be as perfect as the "tuberculin" culture medium described by M'Fadyean and his assistants. In collaboration with Dr. Boerner, in three instances we realized recently the value of this medium. All the preparations containing TB extract remained sterile, the tuberculin agar giving perfect cultures. The procedure of its preparation is, therefore, given here:

Tuberculin flasks containing about 250 c.c. of a 5 per cent. glycerin peptone bouillon, with a heavy surface growth of human or bovine tubercle bacilli, about six to eight weeks old, are steamed for two hours in a board of health sterilizer. The cooled contents are filtered through fine filter paper and centrifuged to eliminate every tubercle bacillus. This is done for the reason that the presence of these organisms is extremely annoying for the microscopic examination of the cultures. The clear liquid is mixed with an equal volume of the same 4 per cent. or 5 per cent. glycerin peptone bouillon and 2 per cent. agar is added. After filtration and correction of the reactions to +1.5, it is, in the quantity of 9 c.c., distributed in test-tubes, sterilized in an autoclave, and, before being slanted, 1 c.c. or 10 per cent. of fresh, sterile, horse or cattle serum is added.

Such a culture medium is prepared easily and the Bacillus paratuberculosis grows very satisfactorily thereon; furthermore, it is transparent and permits readily the control of the growth.

The seed material is best treated with a 15 to 20 per cent. solution of antiformin for one-half hour, as recommended by M'Fadyean; centrifuged and washed three times with distilled water or with saline solution. Comparative experiments, which resulted from the failures in 1911 with antiformin solutions of different strengths, have shown that the Bacillus paratuberculosis is similarly resistant to antiformin solutions as the tubercle bacillus, but in two instances the organisms were apparently destroyed by an exposure of one-half hour to a 20 per cent. solution, whereas a 15 per cent. solution yielded a proper growth.

The centrifuged material consists, as otherwise stated, of purely acid-fast bacilli in tremendous quantities. Badly contaminated material, partially decomposed, has been successfully prepared for the obtaining of cultures, by M'Fadyean as well as by the writer. Still, it is our opinion that the antiformin might have a destructive influence on the Bacillus paratuberculosis, and we prefer to use, if in any way possible, only cultures which were obtained from untreated material.

Liquid Media. Holth has succeeded in cultivating the bacillus on liver broth containing extracts of tubercle bacilli. Also Twort and Ingram have grown bacilli on glycerin liver broth containing dead B. phlei. Only recently have they succeeded in growing one strain of the B. paratuberculosis (eighteen months on outside of the body) on glycerin liver broth without the presence of dead organisms or extracts of other acid-fast bacilli. M'Fadyean and others report the successful surface growth, on liquid media, glycerin extracts of tubercle bacilli, or the B. phlei in ordinary veal broth. Also a mixture of equal parts of 5 per cent. glycerin broth with the filtered fluid bulk of a bouillon culture of B. phlei or the tubercle bacillus, was used with advantage. The growth was, in all instances, similar to the young growth of tubercle bacilli on glycerin broth.

Our experiments with liquid culture media have not advanced to a point that enables us to make conclusive statements. The growth is an extremely slow one, and, at this writing, only a few coarse granules have developed on the cork swimmers, or at the bottom of the flasks. We will report later more in detail.

Microscopic Appearance of the Cultures. On serum or serum agar +TB many small round single colonies are first observed; in about two and one-half to three months they remain either the same size, or grow to large irregular, grayish brown, dry, brittle colonies, which show a darker center, and large, fluffy periphery. All our cultures were grown at 38° C. The slow growth with the incipient small colonies is characteristic. A real film growth, as seen in other acid-fast organisms, has so far not been noticed. Neither under anaerobic conditions, nor at room temperature have we thus far obtained a multiplication of the organism.

Morphological Characteristics of the Cultivated B. Paratuberculosis. The bacilli from all of our cultures are small, only about 1μ in length. On account of this length they appear to be somewhat thicker than tubercle bacilli. In most of the cases they were not in clumps and clusters, as seen in the tissues. There was in all the cultures the tendency for club-shaped forms. The size was the same, when compared with those from the intestinal tract. Only the culture of Twort showed extremely long forms (see Fig. 3) which did not become shorter by subsequent transplantations. They resembled closely bovine tubercle bacilli, and it is highly possible that the strains with which Twort and Ingram were experimenting had, on account of use of egg media, adapted themselves by growing into long forms. M'Fadyean and others, and also the writer, do not agree that in primary cultures the B. paratuberculosis grows longer and thicker than when demonstrated from the specific lesions.

The material from the small colonies can very readily be smeared out for cover-slip preparations, but the large colonies are emulsified only with difficulty. The bacilli do not stain with the ordinary aniline dyes, but they stain according to the method of Ziehl-Neelsen, and according to the method of Gram. They are acid- and alcohol-fast. When stained for twenty-four hours with Giemsa solution, and afterward treated with tannic acid, they retain the stain fairly well.

Pathogenicity. Twort and Ingram,[1] Holth,[2] and recently Twort and Craig,[3] have undertaken inoculation experiments on rabbits, guinea-pigs, mice, etc., with the same results as have been recorded with primary animal material. These animals are entirely resistant to artificial infection. The inoculation experiments intravenously, intraperitoneally, and subcutaneously, by Twort and Ingram, were successful with a few exceptions. The experiments of Holth on calves, subcutaneously as well as intravenously, are not concluded, but are very promising, on account of the reactions obtained with avian tuberculin.

A few experiments have been undertaken which are, however, not concluded at this writing.

DIAGNOSIS

Only recently, when the nature of the disease was more clearly understood, and it became known that the losses caused by it were tremendous, have attempts been made to control it. Naturally this procedure could only be carried out when proper means were given to diagnose the disease at as early a date as possible.

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[1] Centralbl. f. Bakteriologie, 1912, Bd. lxvii, pp. 126 to 136.

[2] Loc. cit.

[3] Centralbl. f. Bakteriologie, 1913 Abt., orig., Bd. lxviii, p. 455.

Since my publication on this subject, in which the chronic course with the symptoms of emaciation, good appetite, chronic and intermittent diarrhea, were not considered characteristic, methods for a differential diagnosis had to be adopted.

Bovines are frequently the subjects of diarrhea and wasting, and one is liable to confound the disease with chronic tuberculosis or parasitic enteritis. The appearance of the feces is not, as has been mentioned recently, of diagnostic importance. Anybody familiar with the clinical features of bovine feces would have great difficulties in making a decision, whether it is derived from an animal suffering from paratuberculosis or strongylosis, etc. At an early stage the absence of any symptoms renders diagnosis rather difficult. From a prophylactic point of view, an early diagnosis is important, as one has all opportunities to prevent spreading of the disease. For the last three years three methods were tested by the writer, with the material available. Some observations which will be mentioned, date back to the time during which I was studying the disease in Switzerland:

The methods are:

(A) Bacterioscopic examination of the feces and scrapings of the mucous membrane of the rectum.

(B) Allergic reactions with tuberculin preparations.

(C) Serologic methods.

(A) *Bacterioscopic Examination.* In my publication it was pointed out that we were able to diagnose about 65 per cent. of the cases observed in Switzerland by simple examination of the feces, selecting in the latter the shreds of mucus. Stained coverslip preparations revealed the bacilli. Also scrapings obtained, with a curette, from the rectum, gave frequently satisfactory results, but I must admit that at the time the writer made the said report he was dealing with very advanced cases of the disease, cases which undoubtedly are rarely seen in other parts of the world. The thickness of the mucous membrane of the small intestine has not been described elsewhere. From recent experiences in Pennsylvania, one cannot recommend the above mentioned procedure, as the results are as varying as those reported by Bang, Miessner and others. M'Fadyean, Sheather and

Edwards diagnosed by the bacterioscopic examination of feces 20 per cent. with certain doubts about 40 per cent. The rectal scrapings made from 15 cases permitted a diagnosis in 33.33 per cent. with doubt in about 46.6 per cent.

We herewith desire to emphasize the frequency of mistakes when a diagnosis is simply based on a bacterioscopic examination of the feces. In the recollection of the writer are several observations where, based on such an examination, a diagnosis of paratuberculosis was made, a subsequent careful autopsy proving the absence of the disease. That open tuberculosis of the intestinal tract, by guinea-pig inoculations can be excluded, is self-evident, and that, on the contrary, paratuberculosis has to be considered in diagnosing "open tuberculosis of the intestines," is clearly stated, and incorporated in the new German laws concerning the eradication of tuberculosis. In cases where rectal scrapings are examined, the "antiformin method" can be used successfully.

(B) *Allergic Reactions.* In 1907 we conducted some intradermal tests with a glycerin emulsion of the mucous membrane of the intestines; later, antiformin preparations were extracted with glycerin and used as test fluids. In some instances a local swelling developed which might have been interpreted as a reaction. Satisfactory and practical results could not, however, be obtained. B. Bang conducted some experiments to extract with glycerin, endotoxin of the B. paratuberculosis in the mucous membrane of the intestinal tract. The product was not absolutely inactive in large doses, but did not give very satisfactory results.

All recent publications confirm my statement in 1908, and emphasize the fact that the animals suffering from paratuberculosis do not react to tuberculin, either prepared from bovine or human tubercle bacilli. O. Bang[1] stated, in 1909, that cows, suffering from paratuberculosis, react with an increase of temperature, subsequent to a subcutaneous inoculation of avian tuberculin, in the same manner as do bovines following the inoculation of plain tuberculin. The results mentioned in his publication, considering different herds, were described in detail, and the method seemed to be extremely reliable.

Horne[2] reports positive results with avian tuberculin applied by the conjunctival (ophthalmic), cutaneous and subcutaneous methods.

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[1] Centralbl. f. Bakt., etc., 1909, I. Abt., originale, Bd. li, Heft 4, p. 450

[2] Norsk Veterinar Tidsskrift, 1908, S. 72; Autoreferat in Berliner Tierärztliche Woch., 1908, S. 235.

Male[1] has tested 55 cattle with 5 c.c. doses of avian tuberculin, and obtained reactions in 9, in only four of which the diagnosis was verified by the autopsies, and proved to be correct in 3. Unfortunately, from his temperature charts (only four readings), the time of the preliminary temperatures cannot be determined exactly.

Miessner and Trapp report also the applications of avian tuberculin to some of their animals.

M'Fadyean, Sheather and Edwards, in their last publication, have used the avian tuberculin by the subcutaneous method simultaneously with the ophthalmic test, in using concentrated human tuberculin for the latter. The dose used was 8 c.c. avian tuberculin for an adult animal.

Out of 14 animals tested in this manner, they could diagnose with the avian tuberculin 14.2 per cent. on the first test and 21.4 per cent. on the second test. From these data it appears that the avian tuberculin is not a very reliable reagent for paratuberculosis. If we take into consideration, however, that the animals tested by M'Fadyean and his assistants were all in a fairly advanced stage of the disease, this observation is not surprising.

O. Bang, himself, mentions the fact that animals noticeably diseased either react only slightly, or fail to show a reaction. He considers this condition to be similar to tuberculosis.

M'Fadyean's publication is the only one in which, on a large number of animals, the statements of Bang have been checked.

Clark reports some work with avian tuberculin, but has only one case which gave a slight rise in temperature, and in which he found the specific lesion at post-mortem.

In looking over the temperature reports of Willis one has difficulty to interpret the reaction; in my opinion, none of the animals have reacted in a manner permitting a conclusive diagnosis.

Our experiments with avian tuberculin are numerous, but we will mention only a few examples; they will illustrate the various phases this test has passed in our hands:

In 1911, Cow No. 786 was tested with avian tuberculin, prepared in the laboratory from an unknown strain of avian tubercle bacillus. No reaction was obtained. As we were not in possession of an avian tubercle bacilli strain of known biological characteristics, we wrote to Prof. Bang for some of his tested tuberculin. This preparation, duly received, was then used for all the tests on artificially infected animals of which records have been given previously. The preparation was also used on spontaneously affected animals, but without result. All of the animals were in an advanced stage of the disease. The following temperatures are selected for example:

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[1] Veterinary Journal, June, 1911, vol. xxvii, p. 324.

(1) Jersey cow, No. 802, tested December 7, 1911:

3.00 P.M.	101.6°	5.30 A.M.	102.4°
5.00 P.M.	102.0°	7.30 A.M.	102.0°
8.00 P.M.	101.0°	9.30 A.M.	101.6°
9.00 P.M.	injection.	11.00 A.M.	101.4°
		1.00 P.M.	102.2°
		3.00 P.M.	101.6°

Result: no reaction.

(2) Bull ("Raymond"), tested August 16, 1912:

3.00 P.M.	102.2°	4.00 A.M.	99.0°
5.00 P.M.	99.6°	6.00 A.M.	99.4°
7.00 P.M.	99.6°	8.00 A.M.	99.8°
7.30 P.M.	injection.	10.00 A.M.	101.8°
		12.00 M.	102.0°
		2.00 P.M.	101.6°
		4.00 P.M.	99.6°

Result: slight rise of temperature.

(3) Jersey cow (D): Inoculated with avian tuberculin, subcutaneously 1.5 c.c. concentrated. There was a pronounced diarrhea in the next twenty-four hours following the injection. The temperature taken in the vagina did not indicate any rise. An œdematous swelling which existed in the intramaxillary space increased about two and a half times its size, firm in consistency, and covering the submaxillary lymph nodes, made it impossible to palpate them satisfactorily. Only after an interval of six days did the swelling gradually disappear.

A conjunctival test made with concentrated avian tuberculin, gave also, when repeated, a doubtful reaction, as in both instances only a mucopurulent discharge was noticed at the inner canthus amounting to the size of a small pea.

Several of the animals (5) were tested and retested with different preparations of avian tuberculin prepared in our laboratory.[1] There was no difference noted between the preparations obtained from Prof. Bang and our own.

From these observations *we are not justified in recommending the avian tuberculin as a diagnostic agent for paratuberculosis.*

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[1] We grow our tuberculin for at least eight to ten months (O. Bang, three to four months).

Some results obtained on experimental animals did show that in the incipient stage of the disease undoubtedly a reaction will be obtained. In the advanced stages, however, they have also failed, in our experience, to react typically. The ophthalmic test, as recommended by Horne, is as unreliable as the subcutaneous test. (See record of Cow No. 802, Jersey Cow D.)

These and other reasons, naturally made it imperative to seek for more accurate diagnostic agents. Since the paratuberculosis bacillus has been successfully cultivated, such attempts have been made.

Holth[1] was the first to describe some experiments with the tuberculin prepared with the B. paratuberculosis on artificially infected animals. Out of several calves, one reacted with a typical reaction; the others only with a slight rise in temperature. All the animals had previously reacted to avian tuberculin.

Twort and Ingram[2] have tested three full-grown naturally infected bovines and five calves, artificially infected, by inoculating them intravenously with "paratuberculin" prepared from bouillon cultures containing B. phlei.[3] The three full-grown animals gave the following temperatures:

No. 1. Maximum temperature, 105.0° in one hour.
No. 2. Maximum temperature, 106.1° in five hours.
No. 3. Maximum temperature, 104.8° in four hours.

Animals 2 and 3 developed a violent diarrhea following the inoculation. No. 2 died three weeks afterward and was affected with paratuberculosis. Out of the five calves tested, Nos. 1 and 4 gave what the investigators considered a typical reaction in three hours and six hours respectively, No. 5 reacted twenty-four hours later, with a temperature of 105.4°. These three animals were found at post mortem to be affected with the disease.

Two artificially infected goats reacted to a subcutaneous inoculation of the "paratuberculin."

From these few observations I deduct that in all probability a paratuberculin will be prepared which can successfully be used for the diagnosis of the disease. As the B. paratuberculosis is growing extremely slowly, such experiments will absorb considerable time. We have undertaken, during the last months, the preparation of such a tuberculin, but have so far not obtained a rich enough growth of the bacillus on the fluid culture media, to permit an immediate preparation of the tuberculin.

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[1] Literature cited.

[2] Literature cited.

[3] Glycerin extract prepared from cultures of the B. phlei gave, in typical cases, *no* febrile rise of temperature; this being another proof that the disease stands not very closely related to tuberculosis. (Malm, own observations.)

(C) *Serologic Methods.* In the year 1907 the writer conducted some experiments with the intention of using the complement-fixation test for the diagnosis of the paratuberculosis of cattle. We used for this purpose antiformin preparations of the intestinal mucous membrane and the mesenteric lymph nodes, dissolving the tissue by means of a 25 per cent. solution of antiformin, washing the precipitate with a saline solution, and using the bacilli (which were obtained by this method) in pure form in a suspension of saline solution.

In *no* instance was a reaction obtained when this emulsion was used as an antigen in the complement-fixation method.

Miessner and Kohlstock[1] report similar attempts with a preparation called "enteridin"—this latter being dried paratuberculosis bacilli isolated from the tissues by means of the antiformin method. They prepared extracts, but obtained no conclusive results.

Recently, C. C. Twort[2] conducted some agglutination and complement-fixation tests on animals experimentally inoculated with the paratuberculosis bacillus. He tested the serum of thirty-one animals, with the complement-fixation test, and among those tested were a naturally infected Jersey bull and a Jersey cow. The first one gave a positive reaction, which became less well marked; as the disease progressed the cow gave a negative reaction. Both animals had been previously tested with tuberculin. This condition has to be considered, as another cow, which gave a positive reaction in his tests, proved, on post-mortem examination, to be affected with tuberculosis in addition to paratuberculosis.

By means of the agglutination test, the naturally infected and experimentally fed bovines gave moderate reactions. Unfortunately C. C. Twort does not mention in his publications the technique used, nor does he explain what he considers a positive or a negative reaction. The preparation of the antigen is given in detail. The main object of his publication was, probably, only to show the close relationship of the acid-fast bacilli to each other; a condition which has been recently more definitely studied by Claypoole.[1] For further discussion of this subject see explanations given below on the correlation of the paratuberculosis bacillus to tuberculosis.

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[1] Literature cited.

[2] Centralbl. f. Bact., 1912, Abt. I, Orig., Bd. lxvi.

CORRELATION OF PARATUBERCULOSIS TO TUBERCULOSIS

Until the bacillus of paratuberculosis had been successfully isolated, the opinion was expressed by Johne and Frothingham, Borgeaud, Lienaux, and Stuurmann, that the disease is only a variety of the bovine or avian tuberculosis infection. Based on animal inoculation, Bang, Leclainche, Miessner and Trapp, the writer and others, concluded that the disease is specific and sui generis. Since the successful cultivation of the bacillus, there exists no doubt as to the accuracy of these observations and deductions.

Rather early the question arose as to the correlation of paratuberculosis to tuberculosis, inasmuch as advanced tuberculosis was found to be present at the same time with the lesions of paratuberculosis, which in my statistical review of 1908 represented about 10 per cent. of the animals.

O. Bang and Holth have conducted some experiments and have shown that the bacillus of paratuberculosis produces a slight degree of resistancy against tuberculosis in guinea-pigs.

The writer found that guinea-pigs inoculated with huge doses of paratuberculosis bacilli, isolated by the antiformin method, succumbed to subsequent inoculations of avian tuberculin in the same way as did tuberculous animals inoculated with ordinary tuberculin. These experiments were made in confirmation of similar ones by Bang.

The experiments of C. C. Twort by means of the agglutination and complement-fixation tests, have also shown that the bacillus paratuberculosis belongs in the group of the acid-fast bacilli, and is closely related to the human, bovine and avian tubercle bacilli, as well as to the bacillus phlei. There was no closer relationship noted of the Bacillus paratuberculosis to the avian tubercle bacillus than to any of the other members of the tubercle bacilli group. The latency of the infection is undoubtedly another proof of the close relationship of the Bacillus paratuberculosis to the tubercle bacillus. With regard to the pathogenicity, the

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[1] Jour. Exper. Med., 1913.

Bacillus paratuberculosis stands between the non-virulent, saprophytic acid-fast bacilli and the avian tubercle bacillus. Further investigations have to prove, perhaps, existing antagonism between paratuberculosis and tuberculosis.

The striking similarity of paratuberculosis to leprosy was mentioned by the writer as early as 1908, and has since been supported by Malm, who further mentions that Babes found that the leprosy bacilli are closely related to the avian tubercle bacilli.

Biologically, Malm has shown a correlation between tuberculosis and paratuberculosis. Artificially infected animals with paratuberculosis reacted to avian tuberculin twenty-one and sixty days, respectively, after the infection. It is possible that the reactions can be seen earlier, in the same way as it is done in tuberculosis infections in calves, where a reaction can be noted after about eight days.

The investigations of this disease, therefore, deserve much encouragement, as probably very important problems of pathology can be solved; and it is hereby suggested that calves should be inoculated or fed with leprous material to determine if these animals are susceptible and if some relationship exists between leprosy and paratuberculosis.

CONCLUSIONS

1. The paratuberculous enteritis found in America is identical with the same disease of European countries.

2. By intravenous inoculations with material from the mesenteric lymph nodes the disease has been reproduced in *young* calves (thirty, ninety-two and ninety-six days of age). The incubation time was from four to eight months. One animal died from the disease twelve months after the infection. Feeding experiments were not successful.

3. The natural infection probably takes place in the early days of life by contact with infected mothers or surroundings. The possibility of an infection on certain pastures, where the B. paratuberculosis leads a saprophytic life, cannot be denied, and is probably of importance for the infection in adult animals.

4. The B. paratuberculosis can be cultivated on solid and liquid culture media containing glycerin extracts of acid-fast bacilli, particularly tubercle bacilli or B. phlei. Five strains have so far been isolated. The growth is slow and only possible at body

temperature. A culture medium consisting of equal parts of tuberculin and bouillon, with 2 per cent. agar and 1 per cent. serum, is the best substrate for primary isolations. The use of antiformin should be limited as much as possible to contaminated material.

5. The bacterioscopic examination of feces and rectal scrapings is of diagnostic value in only about 40 per cent. of the cases in the advanced stages of the disease. Avian tuberculin is an unreliable reagent for paratuberculosis. "Paratuberculin" and perhaps some of the serum tests may prove in the future to be more reliable.

6. The B. paratuberculosis is, in certain respects, related to different representatives of the acid-fast group of bacteria.

THE CHAIRMAN: Gentlemen, this closes the program, and also closes the work of this Section for this meeting.

SECTION OF THE ASSOCIATION OF VETERINARY FACULTIES AND EXAMINING BOARDS OF NORTH AMERICA

New York City, September 1, 1913

President,
Dr. Sesco Stewart, Kansas City, Missouri
First Vice-President,
Dr. E. W. Babson, Gloucester, Massachusetts
Second Vice-President,
Dr. H. P. Eves, Wilmington, Delaware
Secretary-Treasurer,
Dr. Jacob Helmer, Scranton, Pennsylvania

The Twentieth Session of the Association of Veterinary College Faculties and State Examining Boards, as a section of the American Veterinary Medical Association, was called to order at the Hotel Astor, New York City, on Monday, September 1, 1913, at 2 p.m., Dr. S. Stewart, President, in the chair.

The President: It appears that the dividing of our meetings into sections somewhat interferes with prompt attendance. It being past the time for opening this session, I believe we should now begin our work. Let us come to order as the Association of Veterinary Faculties and State Examining Boards. Our Secretary is not with us, so I have asked Dr. Pollard to serve, at least temporarily.

The first item on our program is the minutes of the last meeting. So far as I can learn, a report of the doings of the last meeting was sent to every person interested in the work of this body. Quite a large percentage of the men are members of the American Veterinary Medical Association, and that report was made an appendix to the report of the American Veterinary Medical Association. To all persons whose names could be learned, and to all who were members of examining boards, was sent a copy separate from that report. Thus we aimed to get a copy into the hands of every known member of examining boards throughout the country. It may be, however, that there are some who did not get the report, and if there is anyone here who did not receive a copy I have a few left to which any such members are welcome.

The minutes of the meeting are incorporated in this printed form. What will be your pleasure as to accepting these printed reports?

Dr. Pollard: I move, Mr. Chairman, that they be accepted as the minutes of the last meeting. Motion seconded.

President Stewart: It is moved and seconded that the printed report be accepted as the report of the last meeting. Those in favor manifest it by saying "aye." Contrary, "no." It is adopted.

The Secretary-Treasurer mailed to me a brief report which I will ask our temporary secretary to read.

The Secretary: Mr. President, thirty-seven members joined the Association at Indianapolis. Immediately after the 1912 meeting the secretary, with the generous assistance of President Stewart, began a vigorous campaign to interest all state examining boards in our work.

For this work, in addition to the personal letters sent out from both the office of the President and the office of the Secretary, one hundred and fifty copies of indexed reprints of our 1912 sessions were mailed to members of the various boards. Early in May the Secretary wrote to the Secretary of the respective boards requesting them to have some one of their members prepare and present a paper at the New York meeting. Very few responded, so in June a second invitation was sent to them.

At this time, because of illness, I felt that I could not do justice to the duties of my office and accepted the kind offer of Dr. Stewart to assume them. I wish to heartily thank the President for this kind and thoughtful consideration of me, and will assure you that the double burden of President and Secretary which he has carried the past three months has been no light one.

I append to this report a financial statement as follows:

Receipts

Cash on hand	$1.58	
Collections from thirty-seven members	37.00	
		$38.58

Expenditures

Stamps	$4.00	
Robert Smith Printing Co.	19.50	
Stamps	2.00	
Telegram	.75	
Personal check	12.33	
		38.58

With the heartiest wishes for the most successful meeting to which the Association has ever convened, I am,

Yours very truly,

S. B. Nelson.

President Stewart: Gentlemen, you have heard the report of the Secretary-Treasurer. I will state that attached to this report, and to the financial report, are the items of disbursements, and I believe it is customary to create a committee to which to refer the financial report for confirmation. Additional to his expenditures, I took it upon myself, in his behalf, to incur a considerable expense, and I have simply attached to this the items of that expense. In my hurry in leaving home, I did not bring all of the vouchers, so that the matter cannot be completely shown to the auditing committee. The vouchers are here for Dr. Nelson's expenditures, and there is a statement of the sources from which the money came. It is a report of dues paid in or of funds paid in. What will be your pleasure as to creating a committee to audit the account. The report is before you, gentlemen. Any remarks or suggestions?

DR. BAKER: Mr. President, I move that the report of the Secretary-Treasurer be accepted, and a committee of three be appointed as an auditing committee.

Motion seconded and carried.

DR. STEWART: I will appoint on that committee, Drs. Jacob, Murphey and Seeley.

Now, gentlemen, in order that we may know somewhat who are represented, perhaps it would be well if the Secretary should call the names of the various colleges that are represented.

(The Secretary called the roll, and the following colleges responded as having a representative present.)

Chicago Veterinary College.
George Washington University, College of Veterinary Medicine.
Indiana Veterinary College.
Iowa State College, University of Veterinary Medicine.
Kansas City Veterinary College.
McKillip Veterinary College.
State College of Washington, Veterinary Department.
University of Pennsylvania, School of Veterinary Medicine.
University of Toronto, Ontario Veterinary College.

Of the State Examination Boards, the following responded to the roll as having representatives present: Connecticut, Delaware, Louisiana, Maine, Massachusetts, Montana, New Jersey, Pennsylvania, Rhode Island, Tennessee and Washington.

A MEMBER: Mr. President, the District of Columbia was not called, and I notice it is not in that list.

DR. STEWART: Will you give me the names of the officers of that board and their addresses? I notice in looking over this list hurriedly that there has been an omission as to that board.

A MEMBER: The members are Dr. Hulbert Young, President; Dr. John R. Mohler, Vice-President; Dr. John P. Turner, Dr. D. E. Buckingham and Dr. Page Smith, Secretary and Treasurer.

THE SECRETARY: Vermont has one representative and Iowa also has one.

PRESIDENT STEWART: Some of you may not know, on account of not having been with us during recent years, that we have no dues, but the expenses of this organization have always been met by voluntary contributions. Some time before we close this series of meetings which we shall hold according to the program, we shall have to anticipate the meeting of the contingent expense incurred and make some arrangement to at least pay up to date. I do not suggest taking up any collection just now, but call it to your attention as the method of meeting the expenses of this particular body.

Dr. Baker: Will you suggest how much each should pay?

President Stewart: Our plan has been for each individual to contribute a dollar for the board or college which he represented. A dollar for each board or college will meet all of the expenses.

A Member: It seems to me, Mr. Chairman, that it would be a better method, to have it understood that a member representing a board here was to pay that amount as dues, because boards which have a fund at their disposal could then charge it up as expenses.

Dr. Baker: Your idea is to make it part of the expense of the board rather than of the individual.

President Stewart: The matter of meeting our expenses can be taken up in any manner we see fit. If anyone has any suggestions to make, we will be glad to hear them. If you want to create a committee and secure the fund by taking up a collection, that can be done later on. We will sit on certain days and can take up a collection for the expenses, or if anyone sees fit to make any motion in regard to the matter now, the chair will entertain it.

Dr. Maloney: Mr. Chairman, I move that each college and each board donate a dollar. Motion seconded.

President Stewart: You have heard this motion duly seconded. You will understand that we are an entirely voluntary body and those colleges which do not participate we cannot expect to contribute. The plan, I believe, is a feasible one. Are there any remarks?

Dr. Maloney: Mr. Chairman, I do not know how it is with all of the examining boards, and I do not know anything about the college veterinarians having a fund that they may use in this manner. From the remark of the acting secretary, and of yourself, it would intimate that each member of a board was a member of this combined board, called the Association of College Faculties and Examining Boards. As a matter of fact, I do not know whether our board is a member or not, or whether the membership is made up of the individual members of the board, or whether it is simply a board membership which involves the payment of a necessary fee to care for the expenses. Anyway, it does not seem to me that there are many boards who will not be willing to contribute their portion. Under the circumstances I would like to ask whether it may not be proper to precede the collection of our expenses by making a definite condition so that the matter will be well understood. I would suggest that this be done first.

President Stewart: Perhaps we had better wait until the latter part of our meeting, say the last day, in order to look into this matter of the finances. I think we should understand our relationship to each other a little better. In the past there has not been any difficulty about it. Every one in the meeting could chip in a dollar, and if he belonged to a board he could charge it up.

Dr. Leech: Mr. President, I think the last gentleman who spoke covered my sentiments exactly.

A Member: It does not seem to me, Mr. Chairman, that there would be any objection to passing that motion.

President Stewart: You can act on that motion as you see fit and the general question of putting the matter of our finances in a little more definite shape can be taken up later. Those in favor of the motion will say "aye." Those opposed, "no." It is carried.

Our program makes no previous provision for the paper which I propose to read to you. I crave your indulgence for this paper. It is partly historical, with the idea of showing what has been done, and in order that the members present may better understand the purposes of our gathering and become more interested with the object it has in view.

President Stewart's Address

Gentlemen, Members of the Association of Veterinary Faculties and State Examining Boards of North America: In 1894, in connection with the meeting of the United States Veterinary Medical Association, now the American Veterinary Medical Association, in Philadelphia, there was held the first meeting of College Faculties, at which time an organization was effected. By-laws were drafted and a foundation established looking to the unification of veterinary instruction in the several colleges in the United States. One would judge by the character of the articles of agreement that an early solution of the problems concerning veterinary education would be accomplished. The meeting following this was held at Des Moines when several papers were presented, and where it developed that there were many difficulties in the way of the establishment of a somewhat uniform curriculum in the several colleges represented. Annual meetings were held throughout succeeding years with apparently very little advancement being made.

No published record of the proceedings of early meetings of this organization is available, and I do not believe that any of the papers were incorporated in the reports of the A.V.M.A. After a number of meetings had been held, and after a number of state veterinary examining boards had been created, it became apparent that veterinary examining boards were to become an important factor in solving the complex questions constantly in the mind of the profession of this country relative to veterinary education. A call was extended to the examining boards to meet as a body of examining boards, also to meet in joint session with the Association of College Faculties, and several such separate and joint meetings were arranged and held, yet nothing effective was accomplished other than to show the futility of the methods then employed and to stimulate a deeper study of methods likely to be productive of desired results.

The first largely attended meeting, in which the general membership of the A. V. M. A. took much interest, was held in Kansas City, in 1907, the session being held on the day previous to the regular meeting of the A. V. M. A. The papers presented and the discussions thereon at that meeting developed very clearly the necessity of closer correlation of the work of state examining boards and veterinary faculties. The A. V. M. A. had for many years maintained a Committee on Education and because of the large attendance and common interest in the question at issue provision was made for the appointment of delegates to represent the parent organization, and to make a report to said parent organization as to the work done by the Association of Veterinary College Faculties and State Examining Boards.

The Association of Veterinary Faculties and State Examining Boards has been meeting year after year without any definite form of organization, and as you all realize, we are apparently meeting this year as a section of the A. V. M. A. Last year a considerable discussion was directed toward incorporating this body into the A. V. M. A., it to become a section likened unto a section of surgery, a section of sanitary police, etc. The thought was quite strongly brought out that in order for this to become merged into the parent association, new provisions for membership would be necessary. Doubtless plans for such amalgamation will be presented to the A. V. M. A. this year when proposals will be before it for the reorganization of that body. Until the plans for reorganization shall be submitted and we shall have time to consider them in their various bearings, we cannot profitably devote time to the discussion of that feature of the proposal. As the proposed changes in the A. V. M. A. organization cannot be acted upon for a year, this somewhat loosely coherent organization must plan to continue its present form of membership for at least another year.

In 1908, regulations adopted by the Bureau of Animal Industry in regard to the educational qualifications of appointees in the Bureau of Animal Industry, made in part effective through civil service regulations, injected a new factor in the work of this association, and for a time thereafter the state examining boards suspended active participation in our meetings. The efforts of the colleges, however, were materially vitalized, and there evolved an approximately uniform standard of instruction, the regulations issued by the Department of Agriculture being the standard of guidance. During the past two years, however, it has been found that state examining boards are to be still a very potent factor in the uplift of veterinary education, and the papers presented at the meeting held in 1912 point quite clearly to the field where the examining boards may work most effectively.

It has been quite apparent for several years that uniform examinations by state examining boards would have a salutary influence and would supplement the official regulations of the B. A. I. to a very great degree, as by this means a quite uniform standard can be established for testing the qualifications of veterinarians to enter the field of practice. The bureau established a standard for the federal service, but only a small proportion of veterinarians seek to enter the federal service; rather they engage in general practice. There is no uniform standard governing license to practice, each state having established its own standard and these standards vary greatly. Members of examining boards have lamented this variation because it has worked a very great hardship on the members of the profession who, for various causes, desired to change their habitation from one state to another. Under present regulations it is generally necessary for the veterinarian who moves to take an examination in the new state of his adoption, if he should desire to continue in the practice of his profession. Various plans to overcome this difficulty have been promulgated, but they all involved serious political difficulties.

It has been proposed to enlist the U. S. civil service in giving an examination, and if possible to issue a certificate which, it is believed, would be acceptable in lieu of state examinations throughout the United States. This plan has not as yet been found feasible. While it would serve to establish standard examinations, none of the states would yield to the federal government the exclusive privilege of examining for efficiency and for license to practise. So we seem impelled to look in a different direction for the establishment of a comparatively uniform standard examination. If this can be accomplished, not only would the colleges be given due notice of what shall be expected of their graduates to secure a license to practise in any of the several states, but also due notice would be given to the constituted authorities that a man examined in Maine has submitted to practically the same test as the man examined in Missouri, or the man examined in California would have submitted to an equal test should the same man have sought a license to practise in Colorado. When this state of affairs has been brought about, the writer fully believes that provision for reciprocity will be easily secured, and withal the cause of veterinary education be advanced materially.

The program of this meeting of our association should make it apparent to those interested that the state board features of the problem are given conspicuous place, and the writer hopes that the discussions of the several papers to be presented will make more clear the way for effective coöperation leading up to conditions heretofore alluded to.

The time seems to have arrived when the examining boards of this country have had sufficient experience to enable them to formulate methods by which a standard examination may be established, notwithstanding the different conditions which prevail in the several states and the variability of the laws creating examining boards and designating their powers and duties. It is generally known that the laws in some states designate specifically the several branches or divisions of veterinary science in which applicants shall be tested, also that the designated number is larger in some states than in others, while in yet others much is left to the judgment of the boards as to the character and extent of the examination. Notwithstanding the verbiage of the law in any state, there can be no question that the intent of the law is to provide a test of fitness of applicants to serve the people of that state in a veterinary professional capacity, and if the members of state examining boards fully appreciate the situation, I believe there can be no doubt about their ability to conform with the letter of the law and with the intent of the law, and at the same time give examinations which will meet the conditions needful to establish uniformity of examinations throughout the United States.

When new examining boards are created, the appointees look about them hoping to find some established rules which will guide them in performing their newly accepted duties, and the members eagerly inquire of their acquaintances concerning methods adopted by this state board and that state board, only to find that there is such a great variation that they must work out the problem at home for themselves. In a considerable measure this is true of new appointees on old established boards. While the new appointee may learn of the customs that may have prevailed in his board, he oftentimes finds that there is a considerable personal responsibility and initiative left to him. In other words, he in a large measure is in charge, as it were, of some particular division of the work of the board which has been assigned to him. He goes about the service newly assigned feeling his lack of knowledge concerning what others are doing in his particular branch or branches, and carrying into his work preconceived notions founded on theory rather than experience. The colleges find that graduates fail to pass certain boards while men given the same instruction easily satisfy and pass other examining boards. This leads to the suspicion that there are personal prejudices or want of preparation for such duties on the part of the board members, thus accounting for the failure of graduates to pass, and soon a line of inquiry is established to ascertain the special kind of catch questions which some board or some member of a board propounds to candidates, in order that graduates of an institution may be fortified and fully prepared to satisfy the eccentricities of certain examiners. There can be no doubt that every examiner, when appointed, earnestly desires to be absolutely fair and to render a true service to his state and to his profession, and that he would gladly inform himself concerning the experiences of others, and would profit by the judgment of others if such experience and judgment were available for reference and study. The writer has upon numerous occasions been consulted concerning the framing of questions and the marking of answers, also as to different methods of examinations relative to their value as a test of fitness for candidates for license to practise. Hence he feels positive that if we could embody in definite form the consensus of opinion of those engaged in teaching and in examining candidates for license, we would thereby establish a substantial foundation for progress and for unity in this phase of educational work and public service.

I recommend that at this time there shall be created a committee, to be composed of men who have had experience in holding state board examinations, and who are familiar with the conditions which beset examining board service, and that we ask this committee to formulate a plan by which a body of examining questions in each division of veterinary science may be prepared, and which may be drawn upon by the several state boards in making up their examinations, or, if this be not practical, that questions may be prepared to serve as a guide in the framing of examination questions, establishing thus the scope and difficultness of questions, also needful conciseness of verbiage that applicants may not misunderstand; to fix relative values to be given the various subdivisions, in the matter of gradation; to establish a standard of percentage of efficiency required; and to fix a basis on other matters which experience in conducting state board examinations has made apparent as bearing upon the determination of the fitness of applicants for license to practise.

If such a committee shall be authorized, it should at least have five members, who would be privileged to call to their assistance any member or members of this body who in their judgment could materially aid them in their labors. Such a committee, if appointed within the next twenty-four hours, could hold a preliminary meeting during this convention, and so outline their plans that they could bring to this Association at its next annual meeting a well-digested and effective plan of procedure.

Several efforts have been made, both by the Association of College Faculties and the Association of State Examining Boards, to secure detailed evidence concerning examinations held in the several states, but for want of confidence and authority the reports which have been gathered have been incomplete in not including all of the states, and unsatisfactory in not containing sufficient data.

I recommend that another committee be authorized that shall be commissioned to devise and promulgate a plan of publicity concerning examinations held, particularly in relation to their findings as to applicants for license to practice. Every state board will be strengthened by the information to be thus gained, and every college will be helped to better service, to a better rendering of its function, if it can secure authoritative information concerning board examinations. The ultimate results will be mutually advantageous to the colleges, to the profession, and to the public at large.

I sincerely trust that our sessions here may be productive of marked progress and the best of good-fellowship.

President Stewart: Now, gentlemen, you will note in the program that there were three persons designated to open the discussion. This designation was made by draft as being the most expeditious way of finding someone to open the discussion. After these members have been called upon to offer their suggestions, then the discussion will be open to the house. The first name on the list is that of Dr. Brenton, of Michigan. I understand that he is not with us. The next is Dr. Klein. Did he engage anyone to take his place? I asked him if he would not ask someone of his faculty to accept this duty. As there appears to be no one here to perform it, I will call upon the third member of this list, Dr. J. F. Seeley.

DR. SEELEY: Mr. President and Members: The paper that I have been listening to is one which contained some valuable suggestions, and in speaking for the state board of Washington I would like to say in regard to catch questions that to my knowledge our state board has never asked a student a catch question. For my part, I should like to see them eliminated from state board examinations. Our law does not provide for the examinations or for the passing of students at certain grades. That is left entirely to the discretion of the board. We have a passing mark of seventy, and our examinations are conducted along practical lines, and as much as possible along local lines in regard to contagious diseases. In regard to uniformity of grades I have no way of knowing what the other state boards are doing, and they have no way of knowing what we have done. It seems to me, however, that a man who has passed the examination of the state board of California or Oregon, is competent to practise in those states, and is competent to practise in any state. If we have any standard of uniformity at all, it seems to me that very possibly we could get together on such a proposition. Our law does not provide for it, but in the opinion of our attorney-general, as I understand it, he thinks it is entirely within the discretion of the board, so if we desire to accept a certificate from another state in lieu of an examination we can do so. At different times, in talking with boys who have taken their examinations in other states, we hear a good many remarks which cast reflections upon different state boards. Perhaps some of that talk may be true, but I think, as a rule, they come in for a good deal more criticism than they should. If two, three or four bad eggs get into the bunch, it does not necessarily follow that the rest are bad. I know that so far as the state board of Washington is concerned, we are anxious to have good men come to our state, and we expect to use them fair. After they are there, we are willing to assist them in any way possible. I think Dr. Stewart's suggestion relative to a committee is a very good one. I should think that a committee of two or three from every examination board and the same number from college faculties could go over this matter and make a report which perhaps will be something definite. I believe that it would be a good thing to appoint this committee in the near future and have it prepare a resolution stating their ideas, and to present the same to this body for future discussion. I think, in that way, that within the next year they would probably be able to present something of a tangible nature to this body. I thank you.

PRESIDENT STEWART: This discussion is now open to everyone here present who is interested.

Dr. Pollard: I would like to ask Dr. Seeley if his board has ever exercised that function that he says the attorney-general has given them the right to do.

Dr. Seeley: You mean as to accepting a certificate from another state? Reciprocity?

Dr. Pollard: Yes sir.

Dr. Seeley: We never have, at least not since I have been a member of the board.

Dr. Baker: I would like to ask Dr. Seeley a rather pointed question. Would you be willing to accept a license from any other state?

Dr. Seeley: I think we would be, where the application came from a state where the conditions are similar to those in Washington, and such as they are in Oregon, California, and Montana. The conditions are very similar in those states. In regard to our state, if they showed our graduates uniform courtesy and consideration, we would accord to their graduates the same right in our state. I would not wish to undertake to speak positively for the board, but I think that would be done. We believe in fair play.

Dr. Hoskins: There was one part of your address, Mr. President, which I enjoyed very much. I enjoyed the whole address, but there was one particular part where you referred to the question of a possible federal license which interested me particularly. I think this is entirely feasible. I have not attempted to formulate any plan for our government to act upon, because the question of necessary army legislation has been such that I felt that we ought not to take up anything which was going to endanger that in any way; but I believe that the time is near at hand when we ought to devote some of our effort to work along other lines. I am deeply interested in this subject of a federal license, because of these very difficulties which you have brought to our attention in your paper this afternoon, which have been so freely discussed from time to time. We lack, first of all, in our own country any definite standard of veterinary medicine except that which has been established for entrance to the federal service. That act does not seem to give any right beyond the entrance to such federal service. The examination is conducted to ascertain the qualifications of candidates to enter that service, but, of course, does not attempt to treat these questions arising from lack of uniformity of action and methods of examination carried on by state boards all over the country. In other words, so far as the army is concerned, we have an examination prescribed today that permits men to enter the army, either in the artillery or cavalry branch. We have one standard in the Quartermaster's Department, another in the Bureau of Animal Industry, and another under the government of our foreign possessions, so that in the federal service we do not have a definite standard of requirements. There are no difficulties connected with obtaining legislation by which a federal license may be issued, and federal licenses are what give definite standard covering all branches of the service. There are no serious obstacles to overcome in order to accept a federal license, and I am looking forward to the day when that will be realized. The adoption of a plan for issuing federal licenses could not interfere with state rights to any extent, because it would be entirely optional, and if once put into the cardinal law of the state, it is not likely that there would be any step backward to ever take that out. We must bear in mind that any attempt today to establish a uniform standard of veterinary education or veterinary examination in the states may change with each succeeding year. No board under our political system in this country has any definite tenure of office beyond the period for which the members are appointed. We must remember that, in very many of these instances, the appointments to such positions are purely political, and the men appointed are of varying educational fitness. The men appointed are just as often outside of the approval of the state association as they are appointed from those who are within that approval. Except where cardinal law lays before the state association a recognition of this fact, the standards of examinations and the methods of conducting them will vary from year to year very much. Within the last sixty days a number of young men who successfully passed one of the state boards went to a neighboring state, and out of eight, six failed. The reason for that was that the board in the second state was an entirely new board, and they had established their own standard of what they would require in that state. Now that is just what is going on continually, year after year, so far as our state boards are concerned. On the other hand, if we had a federal license it would do much to establish the status of the American veterinarian, or the practice of veterinary medicine.

When a man goes abroad and says that he has a certificate from a board of Pennsylvania or of New York, or the man who goes abroad says that he has a diploma, that has nothing definite about it. That does not mean anything to the people over there. They may know where Chicago is, and they may know that Kansas City is away out in the far west, but they know little or nothing about the standard of their schools. If we had federal licenses it would be very helpful in that direction. The practitioner who has such a license will be recognized particularly as a man well up in the profession and as one who has kept himself posted on the progress of veterinary medicine. After long years of study on this problem, I believe that a federal license will be the only solution to many of these present difficulties.

Dr. Farrington: Mr. Chairman, I would like to make one statement with reference to the examinations for federal inspectors. At the present time the examination for a veterinarian in the Philippines is the same as that in the Bureau of Animal Industry. The examinations are interchangeable. That has recently been established.

Dr. Stewart: I would like to say just a word for those who have not listened to this discussion. The statements made by Dr. Hoskins are interesting. He stated that when the government issues a standard examination it is likely to be accepted, but that time is not here now. There are some things that we might now do among ourselves which would be a means of furthering the work aside from the license which the government would be ready to issue to those who would take the federal examination. So, in my address, I made the statement that it does not now seem feasible to take that step, and hence the proposal that we do something ourselves looking to the unification of our standard.

Dr. Babson: Mr. Chairman, I was very much interested in that part of your paper in which you had something to say about asking the various boards for data as to their examinations so that this Association could form some idea what it will be necessary to do to bring about some uniformity. I understood from you that some attempt had been made to gather such data but that very few boards have responded.

Dr. Stewart: That is my information. Very few.

Dr. Babson: Could you give me some idea, Mr. Chairman, what number did respond to that request?

Dr. Stewart: I think about 25 or 30 per cent.

Dr. Babson: Was there any idea or attempt to do anything with the data?

Dr. Stewart: Why, yes; of the data gathered of college faculties there was an attempt made to utilize it, but the data was not sufficient to guide them to that end. They found out that in some states students passed in these examinations and in others they failed, but they did not get copies of the examination in order to see just what the character of these examinations were, and they did not get the percentages made by those that failed and by those that passed. As an illustration of that, the Bureau of Animal Industry made out a statement, which I believe they furnished to interested parties and particularly to the colleges, giving the number who took the examination and the number of graduates from the several colleges of those who won, and giving the per cent. which passed and the per cent. of those that failed. I feel sure that the colleges were very glad to receive this sort of information. If the colleges could have that same sort of information concerning the applicants from other colleges in the several states, they would be prepared to understand the situation and requirements necessary to be met in order to enable graduates to pass the several examinations. They, of course, would like to have a copy of the examination so that they might have the correct scope of such examination. You understand the colleges are made of humans and those humans are frail and they are doing the best they can, but they need the guidance of the state examining boards. If this sort of information could be collected by the committee which was authorized by this body, and if it was published so that we might have access to it, I think the state boards would get into harmony in their work, and the colleges would join with them, and the general trend would be highly beneficial in the education of young men who practise veterinary medicine.

Dr. Babson: It has been my misfortune not to be able to attend the American Veterinary Medical Association conventions in the past, and therefore I am not familiar with the workings of this Association, but I have read in various publications more or less about the discussion of this question, and from what I have heard, thus far, I take it that it is a conceded fact that the state examination boards are attacked on account of their not being practicable. Is that the accepted fact?

Dr. Stewart: Yes. Attacks have been made that questions have been asked which were not of a practicable nature; others obscure, or which were capable of bearing two or three interpretations, and also that one would have to write a book in order to answer some particular question.

Dr. Babson: It seems to me that I have no recollection of reading anything on that line officially.

Dr. Stewart: It probably has not been published.

Dr. Babson: I think it is only fair to the state boards that some thing might be presented to convince us that such criticisms have been made. I have never attempted to get questions from other boards, and would like to see some of them so that I could form my own judgment and convince myself. If I were called upon to send in a copy of our questions, I should gladly comply by sending a copy of our last, the July examination.

Dr. Stewart: I would like to reply by stating that I did not make the call, and I do not know that the Secretary of this body made it. If made, it must have been by some other person. So far as my knowledge extends there has been no collection of information on this point which has amounted to anything.

Dr. Hoskins: Such information has been published, or at least some of it has, and the sources of the questions that have been asked by certain boards. Some of the examiners have been followed by very sharp criticism as to the character of their questions. The boards have not been named, of course, but the questions have been published as having been issued by some state boards.

Dr. Stewart: I remember of seeing a question that purported to have been asked by a state board during an examination on anatomy. There were a number of questions, one of which I distinctly remember. It was, "Describe the lungs, liver and heart of a horse?" There were nine other similar questions on that examination. Naturally, there would be some criticism with questions framed in that way. It would seem to me that if the examination consisted mainly of questions of such a general character, that the criticism would be well founded.

Dr. Babson: I have no doubt that may be so if such questions were actually used, but I am rather disposed to question whether such were actually used by any state board.

Dr. Stewart: It is matters of that kind that have given rise to the desire for a more uniform system of examination, and that is why a proposal was made to you in this paper that we might have definite information through the collection of data and exchange of examination questions.

Dr. Seeley: I think that is a very valuable suggestion. The state board of Washington would be glad to exchange questions with other state boards, and will be glad to exchange with our friend from Massachusetts. When I get back, I will be glad to send you a copy of ours.

Dr. Maloney: Mr. Chairman, I do not in any sense pretend to represent the feeling or sentiment of the Massachusetts State Board of Registration in whatever remarks I am about to make, but am giving my personal opinion. I have been a member of the board since its inception, eleven years ago, and much of the discussion that has been before the board at various times has been brought up simply as a matter of discussion between ourselves. I do not know that the members of our board have discussed this matter with the members of the boards of other states. It seems to me that the whole proposition is divided into two parts: First, the college faculties, themselves, are in no sense a unit on their curriculæ. In fact no two colleges are alike in their teaching, which bears out what our friend, Dr. Hoskins, has said. The colleges, themselves, have no definite standard of veterinary education, and it would seem to me that the first and most desirable thing to do, would be for the college faculties to get together, either by themselves or by a committee, and establish a standard of veterinary education. Then the examining boards of the various states could get information such as they are dependent upon for the material from which to ask questions. The standard of questions also might be determined; but so long as there is chaos among the various schools, they, themselves, having no concerted, definitely known related method or line of teaching, I do not see how the examining boards can correlate and be united, when the course of education which is given in each school varies greatly from a small to a very large degree. Therefore, it would seem to me that one of the first and most essential things would be to standardize our education. Now, it is true, as Dr. Hoskins has said, that among the men appointed as members of state boards there are some that have no educational qualifications, or, rather, insufficient qualifications. They are incompetent members on that board. It is equally true, that there are many college faculties which have teachers who are incompetent. The men who accept positions as examiners are best represented by the questions which they ask, and those questions oftentimes are very fair indications of the education which such men, themselves, need. I believe that one of the first and most important things that this body should do, is to separate into equal parts the college faculties and examining boards, and then first get from the college faculties a standard according to which examinations should be conducted, but this would seem impossible so long as the courses and the character of the teaching in the various veterinary colleges vary so greatly, hence I do not see how progress can be made until that part of college work is perfected.

Dr. Stewart: If you will pardon me for interrupting a moment, I will say to Dr. Maloney that the colleges were organized for that very purpose. But from the time, in 1904, when the matter was first taken up, to the time that these bodies commenced to work together as one, the colleges were never able to do anything. They discovered that there were difficulties that they, themselves, could not overcome, and it has been apparent from the very first that such was the case. I have been greatly interested from the college view-point and have gradually come to the conclusion that if the examining boards could get some standard which they would insist upon, the colleges would try to prepare men to meet that standard. If the state examining boards can get somewhere along that line, so that what they may require will be definitely understood by the colleges, so that the latter can prepare for it, I feel very sure that the colleges will do everything they can to meet such a demand for a higher quality of work. The examining boards have been so different, in qualification and requirements, in various states, that the colleges could say to their weak men, "You go to this state for your examination," and to their strong men, "You go to that state." If we can get nearly uniform state examinations, then we will have taken away a temptation, and have overcome the criticism that the colleges are not teaching up to a fair standard of efficiency.

The make-up of the program for this meeting would indicate that the colleges are not indifferent to the necessity of some correlation from among the state boards. The colleges are willing to join in and help, but they need collateral force to make the matter a success. I think the two should work together for their mutual advantage, and that the purpose in putting this particular matter before you in this paper is to see what could be done to help this problem.

Dr. Maloney: Mr. President, I do not want to occupy all of the time, but in answer to your answer I would say that you have rather drawn my fire. I think, perhaps, while I am on my feet, I will have a suggestion to make and I only offer it now as a suggestion. All of the members on my board do not agree with me, but I believe it would be a very desirable thing and help toward standardizing the quality of our examination papers in the various states, if the chairman of the boards throughout the country were selected to organize into an executive body, not perhaps for the purpose of going so far as to lay down in exact language the verbiage to any particular question, but to lay down the character and scope and intention of the examination; but after all, the standard is to be determined by the standard of education that is now being given by the colleges themselves. I did not intend to say as much at this time to you but you drew it out. I merely offer it as a suggestion.

Dr. Murphey: Mr. President, I have been very much interested in this discussion—in the paper and the discussion that followed it—and it seems to me that we need some more fundamental facts. There are some other points which we should take into consideration. In regard to standardizing state board questions or examinations, I refer more particularly to the general scope and the method of correcting those papers. I think that would be a very desirable thing except for one problem or point which was brought up by one of the speakers, and that was in regard to meeting local conditions. We would have some difficulty to meet local conditions where the practice is necessarily different. However, I think the scope could be made wide enough so that we might overcome that.

In regard to standardizing the curriculæ of the various schools, this problem becomes foremost at once. What are we going to do with the matter of terminology in all of the states? What are we going to do with some of the fundamental definitions? We have been told by members of three different boards that they were unable to get men to give uniform definitions. We might standardize our general forms and our definitions, and I think then the standardizing of the curriculæ would be as near as we would ever get it. That, of course, is due to the fact that even two men that have had the same training, perhaps at the same school, will differ in certain principles. If that is the case then, how much more would be the case with students coming from various schools. The faculties of other institutions would probably have some ideas of their own in reference to the proper method of presenting a subject.

Another problem is in regard to the percentage for passing. There is no uniformity as to that. A student may take an examination in a certain state and get a certain percentage permitting him to pass, and then take an examination in another state and fail. Now we all recognize where that puts a person, and yet the person or standard of passing in that state may be as high as that of any other state, so while I would be in favor of establishing if possible a standard for the examinations, I think first we will have to go back and standardize the curriculæ so far as the general principles are concerned. This whole matter is one which will require a great deal of study, and it will take some time to work it out. What we really need, it seems to me, is to have a committee which will work over the matter for a number of years. We do not want a committee which will make a hasty report and then be disappointed in it. If we could have the problem worked out in that way I think it would be very helpful to us all.

Dr. Babson: On the question of the standard of the state boards, I can only speak from the experience of the Massachusetts board. We have been registering men as the result of examinations since September 1, 1904. We require a standard in marking of 70 per cent. The average is 70 per cent. We have an annual report to make to the Governor in which we have incorporated in tabulated form the number of persons who have taken the examination from each college. That has been in existence thirteen years and I would like to submit them to you or to any other person present who would like to examine the same. It gives the number from each college, and the number which have passed, as the result of one, two or three examinations; also the number rejected. That, in a way, I think gives the experience of the board covering a period of thirteen years.

A Member: Mr. Chairman, there have been two suggestions made which I think transcend anything which I have heard. The first is the suggestion of Dr. Hoskins in the formation of a federal board. If a federal board could be formulated so that registration could be to one standard, it would be a pretty stiff state which would not alter its law to allow for the reception of a federal certificate in payment of the state fee. I think also that the suggestion for the standardization of college faculties is most excellent. If I were a member of a state board, and if I wanted to be thoroughly honest and conscientious in my duties on that board, and if I wanted to do the best I could for the state, there would be only one standard for me to follow in my part of it, that would be the standard of the school, that at that time, so far as I could ascertain, was giving the best education. We have got to have a standard or limit of some kind. If you put the standard down to the medium, or take the average teaching and divide it by two and set your standard in the middle you are not doing justice to the practice of veterinary medicine; but if you put your standard on a par with the school that is giving the highest and best education, some of the other little schools will raise the complaint that you are roasting them. That only shows the necessity for a thorough study of the situation.

Dr. Smith: Mr. Chairman, so far as the veterinary schools are concerned, they have been greatly influenced by the standard which has been set by the Bureau of Animal Industry and also by the American Veterinary Medical Association. Now why would it not be possible for this Association to recommend to the A. V. M. A. that they appoint a committee to investigate and recommend to the different state boards a uniform examination and standard. I think that would be the solution of the problem. The Association has a committee to investigate the different schools, and why would it not be a good idea to recommend that they examine the boards and also the schools?

Dr. Knowles: It is one thing in examining for a license, and it is quite another thing to formulate a standard which will be applicable to the needs and local requirements of the various state boards. They are vitally interested in this matter. The Montana law requires that there should be a reciprocal exchange where it would be done without lowering the standard of requirements in Montana. The Montana board, as it now stands, is willing to accept licenses from other states issued to meet the same requirements or requirements equal to those of Montana. In our experience, brief as it is, we are of the opinion that it is not so much the colleges as it is the individuals. My opinion is, no college can be standardized, and that no system of colleges or of college requirements can be standardized that will make the men equal so long as the men themselves are so unequal. Take the various colleges represented in our recent examination, and we could not see that there was anything which was favorable or unfavorable to any particular college, but the marked discrepancies in the results of the examination came apparently from the individuals.

Dr. Buckingham: It seems to me that the gentleman across the room, when he made the remark that it would be possible to standardize the colleges, made a remark that is almost impossible of fulfilment or realization. For instance, does he suppose for a moment that the pathologist would change his definition of inflammation, or that a professor in the medical school at Harvard would do likewise, at the suggestion of a committee appointed to standardize the terminology or the definition of its various terms? As a member of an examining board for the last seven years, I have found very frequently, as Dr. Knowles has said, that a man who applies for an examination does not always reflect the school that he comes from in his answers. Being a graduate of the University of Pennsylvania, I have frequently thought over the names and qualifications of the men who graduated in my class—as to whether or not they could pass my board. I believe one or two would possibly fail, and while my school is recognized as one of the best schools of the country, I have come to the conclusion after twenty years of practice and thought upon this subject that it is not the school after all, and that it would be impossible to standardize the schools. We can get together with examination boards to a certain extent, but when it comes to having all the schools teaching every man exactly alike it is impossible. The state of Virginia allows any man to come up for examination whether he be a graduate of a college of veterinary medicine or not. If he can pass the board or answer the questions that is all that is necessary. No state would reciprocate with any such condition as that, and it seems to me that it is a useless discussion.

I come here year after year, and I want to compliment the President of this Association on his able address and suggest to the members that we stop talking, and that we get busy and appoint this committee to study this question and suggest some way out as our able President has suggested. I believe it is the only way out of this darkness which hangs so thickly over the examination boards and faculties. We have been hammering at this question for some eight or ten years, and I do not believe that we will make any essential progress until the matter is referred to some such committee to take it up actively and make a thorough study of the whole situation.

Dr. Murphey: Mr. Chairman, I simply rise to protest at having anything read into my remark that I did not put into it. I recommended the standardization of curriculæ and definitions, and, so far as it could be done, uniformity of terminology. I recognize, however, full well, that we will never be able to do that in any exact sense any more than two men of about the same ability and having the same teaching would come out and teach the same thing in the same way.

Dr. Maloney: Mr. President, I think it is perfectly possible to standardize curriculæ, and I do not believe that that means that every man will come out with his mental limitations equal with the other man. That does not excuse the schools and faculties at all. Each man that goes to a veterinary school has the right to have presented to him his full measure of veterinary instruction, and there are some schools, as has been positively proved, that are not treating the men fairly. That is the kind of standardization that we need and want, and that is why we want no reciprocity until we have a standard curriculæ. We cannot have it as the gentleman has stated. We do not want to reciprocate with states which will take in a man who, by some fortune, as most men on faculties know, gets a certain percentage and is passed. He is not always a man fitted for practice, and when he gets into a different atmosphere and has to stand the test of a reasonable examination board he fails. I think our table is referred to by Dr. Babson, showing that certain schools are not turning out men as well trained as they should be. Those men are not getting by because they did not get the education that they went to those schools for. That men have failed who have come from very good schools is true. That has always been true and always will be true, but the majority of men that fail at the test imposed by a reasonable examination board fail because they have not had the training that they should have gotten from the school.

The President: The Bureau of Animal Industry has already established a standard which the various colleges in this country have recognized as a standard. How far they are carrying out that standard is best shown by the way in which men coming from the schools are meeting those requirements. The colleges should find out as well as the examining boards whether they are complying with that standard. That is why the suggestion was made that we have a uniform or nearly uniform examination throughout the states. We would then have definite information as to the character of the questions asked, the number of their men that failed, the colleges themselves would discover that they are not meeting this standard and the result would be that they would either meet the conditions or go out of existence. Hence, I recommend the establishment of that standard.

Dr. Maloney: I perfectly agree with that.

Dr. Boor: Dr. Maloney made one remark that I believe he did not intend to make. As I understood him, he rather put the blame for students not passing upon the colleges. In my experience I have found this to be the case—it is not every student that is fortunate enough or wise enough to take advantage of his opportunity for instruction when he has it. It is not the fault of the educators. It is not because the student has not had a proper opportunity for education. It is because he did not apply himself when he had the chance. You cannot lay it on to the colleges or the instructors. The men that are there to be the recipient of that education must apply themselves if they are going to get the most advantage from it.

Dr. Maloney: I do not think the gentleman understood my proposition or my statement.

Dr. Boor: Well, you criticised the colleges for not turning out better men. The colleges are not to blame if the men do not apply themselves. A man must apply himself and take the full advantage of his opportunity. Otherwise, he will miss it. They used to try to drive it into us, but the old methods of instruction have gone. The colleges at the present time give every student a chance to study, and if the students do not take advantage of their opportunity you cannot lay it on to the schools.

Dr. Maloney: I think, Mr. President, that the gentleman misunderstood me. My statement was that the examination board of Massachusetts had taken the trouble to make up a table each year showing the value of each college, and showing that men did fail sometimes that come from the very best colleges. That has always been true, and a large per cent. of those who fail continually are men who did not get the education that they ought to have had. For that I do not think the men alone are to blame. Our records here will show that.

A Member: Could we have that record read?

Dr. Maloney: It is a tabulation of the results of various examinations, giving the number of men taking the examination, the various colleges from whence they came, and the number of men who failed on the first, second and third examinations. These colleges are given in a direct line; also the number of examinations and the totals:

Cornell University. 6 examined: First examination, passed 6.

Ohio State. First examination 5; passed 5.

McGill Univeristy. First examination 4; passed 3; second examination, passed 1.

New York—American. 7 examined. First examination, passed 6; rejected 1.

University of Pennsylvania. 19 examined, 16 passed first examination, 1 second examination, 1 fourth examination and 1 finally rejected.

Harvard Veterinary School. 8 examined. 6 passed on the first examination; 1 passed on the second examination and 1 rejected.

Chicago Veterinary College. 12 examined. 8 passed on the first examination, 1 on the second, 1 on the third and 2 rejected.

United States College of Veterinary Surgeons. 3 examined. 2 passed on the first examination and 1 finally rejected.

New York Veterinary College. 3 examined. 3 passed on the first examination.

Iowa State College. 1 examined. 1 passed on the first examination.

Royal Veterinary College. 1 examined and failed on the first examination and passed on the second.

Laval. 1 examined. 1 passed on the first examination.

McKillip. 6 examined. 3 passed on the first examination, 1 on the third, 1 on the seventh and 1 finally rejected.

Columbia Veterinary College. 1 examined. 1 passed on the first examination.

Grand Rapids Veterinary College. 3 examined. 1 passed on the first, 1 on the second and 1 finally rejected.

National Veterinary College. 1 passed on the first examination.

Ontario Veterinary College. 24 examined. 8 passed on the first examination, 2 on the second examination, 2 on the third examination and 12 finally rejected.

Non-graduates. 22 examined. 10 passed the first examination, 3 the second, and 9 finally rejected.

Candidates from Correspondence Schools. 11 examined, of which none ever passed.

The total number of examinations was 138, of which 82 passed on the first, 12 on the second, 2 on the third, 1 on the fourth, 1 on the fifth and 1 on the seventh, or 39 out of the 138 finally rejected, and 82 passed on the first examination.

Dr. Murphey: I would like to ask if the state law still permits examination of non-graduates.

Dr. Maloney: That is according to our law.

Dr. Pollard: I would like to ask how the examination compares with that given to non-graduates.

Dr. Downing: How many examinations are allowed to one student?

Dr. Maloney: I would prefer that the Secretary answer that question.

Dr. Babson: If a man fails upon the first examination he is allowed to take the second. After that a fee of five dollars is required for each examination.

A Member: Can you tell us about what per cent. of the non-graduates pass?

Dr. Maloney: Referring to the tabulation, I find that there were nine of the 22 finally rejected, about 40 per cent.

Dr. Boor: Did you give them the same sort of an examination as you did the graduates?

Dr. Maloney: Yes sir. I think it is fair though to explain that that comes in with the question that Dr. Hoskins brought up in his talk, in which he stated his doubts that he could pass some state board examinations being twenty years out of school, and cited it as being in a way the consensus of opinion of the members of our various boards. I want to say that the registration of men in Massachusetts is more or less discretionary. There were men distinctly eligible, and our law stated that all who had been in practice had the privilege to continue if they applied on or before a certain date. But, like all men, there were some too late to catch the train, and when we made up the list we could not cut out those non-graduates. They were distinctly eligible under the law, and besides there was great pressure in the legislature to extend the provisions to other men. Apparently on account of that situation we registered some men because they were eligible, and it made very little difference whether they were registered on the first day of September or the second day of September. We had to register them to save our registration law. I cannot say for an absolute fact, but I think there has been no non-graduate registered by our board in the last eight or nine years, possibly longer.

Dr. Leech: That is precisely the trouble that most states have. Our examination is just the same to non-graduates in our state as we give to graduates. We have just the same proposition to meet that you have in Massachusetts. It seems to me certainly fair and right that we should come together and work out some solution. We certainly must come to some understanding in regard to the state boards and college faculties. I think it would be a very fair thing to take three from the boards of veterinary examiners and two from the colleges to constitute such board. I think in that way we might come to a mutual understanding as to what was best. We should, however, come to some understanding between ourselves first.

Dr. Bland: We have this same thing to contend with in Connecticut. Anyone can come up for the examination, and we don't object because we get ten dollars from them. I will warrant you, however, there is never one that passes. I did not see the necessity of it, but we registered a great many because we had to do the same as in the other two states, but we do not have to do so any more. That was eight years ago. We have not registered non-graduates since.

The Chairman: This discussion is profitable and interesting, but, we are, however, taking an undue share of the time for this paper. I wish in passing that you might see your way clear to do something definite looking to the accomplishment of something for the future. Is there anything further relative to the paper and the proposition which it contains?

Dr. Frazier: I would like to ask the doctor from Massachusetts if there has been any difference in the last six years in the number of failures and the number that pass as compared with the previous period.

Dr. Stewart: While I am on my feet, I would like to refer to the report issued by the Bureau of Animal Industry. It gives the year in which the applicant graduated, the name of the college from which he graduated, and the per cent. he made in the examination. Now, if we could have from every board a statement of that character coupled with a copy of their examination questions that were used at the examination, and have it all correlated into publication, we would be very much better situated all along the line, especially those of us who are connected with the colleges to advance the cause of veterinary education. I have been studying this problem ever since 1904, and I cannot see any other better way to get at it. It is simply an effort to correlate just the kind of information that we need. Some states are responding and some are not. That has been the experience. Consequently, it is obvious that we need more cohesion and coöperation among state boards and the colleges in order that we may have this needed information. One difficulty with the efforts that had been made in the past was that some members would be forthcoming and some members would not be. If this body will pass a vote authorizing a committee or some particular body to gather this information, or to make application for it in some official way, as by the authority of this organization, I believe the information will be forthcoming.

Dr. Murphey: Mr. Chairman, I move that a committee be appointed to obtain this information with production to the next annual meeting of this body. Motion seconded.

Dr. Stewart: It has been moved and seconded that a committee be appointed to get the information and to present it at the next annual meeting of this body. I am sorry that it did not go wider and undertake to get our men together to formulate a standard so that we might let the whole thing go together.

Dr. Maloney: Is the question open for discussion?

Dr. Stewart: The matter has been pretty well thrashed out, in a somewhat informal way. I suppose that further debate is in order.

Dr. Maloney: I would be very strenuously opposed to the passing out of the questions by the various examining boards in that way. I would prefer to stick to my original proposition, for the colleges to present us with a standard covering the scope of our examination rather than the detail questions. I do not understand that it is the function of the board to do anything toward having their men pass the examination boards. The board is there to determine the quality and quantity cf the answers given by students to the questions which have been submitted to them. I think the motion should be worded more carefully; that it should be a little more broad if the committee is to take it up.

Dr. Murphey: The idea was that this necessary information should be gathered and studied with the idea of making a further detailed report. Of course, the questions such a committee might gather would be those that have been asked in previous years. That would not have anything to do with the questions that were to be submitted at future examinations. It was not the idea that such a committee should have the direct questions submitted before the questions themselves were used. The question is, What kind of an examination has been given, whether it was fair, and if it was fair, whether it was too long, or too short, and as to the nature of the questions themselves, whether they were such as would tend to bring out the real knowledge of the student on the subject. I think the committee would have to report conclusions along that line, which it strikes me would be of great benefit.

A MEMBER: I think there is one part of this subject which has not been mentioned, viz., the value of a subject, taught by any school in a weak manner. Where a student who has been to a school in which some subjects are weak undertakes to be examined and answers the questions based on such training, the result always lowers the standard and average of the person that is being examined. It is not often one will see a school weak in all its branches, but more often one will find a school which is weak in one or two. There is where the examining boards could help schools by reporting the weak subjects.

DR. HUGHES: It appears to me that there has been considerable said here in regard to the standard of the schools. We of the private schools are pretty confident that they are today living up to the standard which has been exacted from us by the Department of Agriculture, which we think is a pretty good standard. We think it is fair. It goes into the minutiæ of things, and tells us exactly what subjects we should teach, and tells us the hours we should devote to each. We are not expected to tell exactly, because there is a little leeway, or a little elasticity, and we need not show the hours. Now having that standard to go by, why could not your committee adopt the practice of the civil service committee, as laid down in the United States *Manual*, *i. e.*, give the questions, and make out a list of questions to guide this committee which you propose to form. If the committee could get questions, not necessarily the same questions from each school, it would give us some kind of a guide to follow.

A MEMBER: Mr. Chairman, could we have the Secretary read the motion?

THE CHAIRMAN: The motion is that there be a committee of five appointed for this purpose. I want to comment on that for a minute. The various colleges now feel that they have a guide as to what they should teach. The various examining boards have no fixed guide as to what questions each of the several boards will ask. If for one year, or for two years, which would be better, something like this could be done, then each one could see the kind of examinations which the other boards are giving and we would be able to get things together. As it is now, the schools have not been teaching the points in some instances which the boards have required, and it is not fair to expect applicants for practice to know about them. That I do not think anyone expects, but it is vital to have a standard of efficiency. It seems to me that a great deal of good would come from a movement of this kind, because it will show what will be required and the degree of knowledge in a general way which will be required, and it will make definite what has been more or less indefinite and badly understood in the past.

DR. MALONEY: Do I understand that by a motion this committee is to gather such information and to make its report upon the information so gained?

THE CHAIRMAN: Yes.

DR. BAKER: Dr. Murphey stated that he intended to cover both phases of this subject, both as to the number of questions asked and as to the character of the questions, so that they should be published with the successes and failures, not giving the names, but giving the number of young men and the college from which they came, thus giving us something positive and definite.

Dr. Maloney: Is the committee to be appointed for the purpose of gathering such information to use, from the various boards as the basis of their information?

The President: Yes. That is as I understand it, and they are also to get such data and information from the colleges in order to show the scope of their curriculæ.

Dr. Babson: Do I understand it would then be the function of this committee to bring all together and report some feasible plan to this Association?

Dr. Hughes: Why delay this?

Dr. Babson: I am not trying to delay it.

Dr. Hughes: Why can we not have action on this matter at this meeting? We know what the character of the questions that have been given in the past are? Some of them are fair and some of them are unfair. I do not for a minute undertake to charge any one with giving unfair questions. Will this committee try and specify a set of questions so as to obviate the difficulty which has come from the asking of improper questions? We want to get away from this odd state of affairs, where a man has been caught with the questions in his notebook. Will this committee try and prepare a specified set of questions which shall act as a guide, so that it will not take a man two days to write the examination on anatomy alone. Why not start in now, without losing the time which will be taken up in the efforts to gather this information? We all have seen questions gathered from nearly every state. I have got a pretty good idea of the character of the examinations given in the various states. I think everybody here, especially those who have been identified with teaching and members of the examining boards, have the same information. Why lose this time? Why not take it up now and set a standard of some kind?

Dr. Murphey: Mr. President, I do not wish to prolong this discussion, but there are just a few things in regard to it which seem to me to be pertinent. It was my idea that the committee should content itself, first, with passing on the state board question entirely, and the conclusions or recommendations they made afterward would be a sufficient guide to the veterinary schools. The whole work of standardizing the veterinary schools is carried on by the Bureau of Animal Industry. As it is now, when the Bureau wants a man to take a civil service position, it can call on those who have had a standard course of study in veterinary medicine and other necessary topics to fit them to pass this examination.

Now just a word in reply to Dr. Hughes. I do not think we are in a position at this meeting to appoint a committee and have the committee meet and report in time for action here. I think time will be required to study this whole proposition. I do not believe that we are able to pass on this without time to study the details.

Dr. Hughes: I would like to ask the gentlemen who just sat down whether he has read the questions given by the Bureau of Animal Industry at these examinations, especially with regard to the matter of the practical questions?

DR. MURPHEY: Yes, I have looked them over. I don't think there is any difficulty on that line, except a number of the questions may be problems in veterinary medicine relating to matters that we do not have to do with in this country.

DR. GILL: Mr. President, I cannot for the life of me see where the asking of the questions is going to affect it much. That is not the difficulty as I look at it. It is in the answering of these questions where the trouble comes. I have had examples in the last year. For instance, an examiner may ask a student at New York to discuss the glanders question. We are right up to date on glanders, and we know or we believe in some things possibly which are not believed outside of the state. We have our bacteriologists and they come and work with us. To give you an example of an actual fact the question was, "What treatment would you give for rabies in dogs?" The answer was, "Cauterize and the Pasteur treatment." The question was marked 50 per cent. as being impracticable and expensive. It is not the questions that are at fault. How are you going to get information when one professor will teach one way and another, another. An examiner may call for a discussion on tuberculin. For instance, the question may be, "When does the reaction take place after an injection of tuberculin?" and the student answers, "Within one or two hours after." Well, as a matter of fact, we know that the reaction really takes place almost immediately after the tuberculin has entered the circulation. But he was marked zero on that question. There is a good deal to this matter for thought and study, and it seems to me that hasty action is not going to help the matter.

DR. BAKER: I agree with Dr. Gill. He says it is very easy for anybody to ask questions, but I maintain that it is a very difficult thing to frame questions properly, in such a way as to avoid ambiguity, and not to confuse the candidate. The question should be in very concise language, and should be asked in such a way that the candidate may know what the examination fairly calls for. Then when it comes to marking the answer, we will be governed by what the science calls for as it is today, and according as the candidate has been taught.

So far as the standard is concerned, the various state boards can set the standards. The most difficult part for a state board is to ask the questions properly, to properly word their questions so that the student will not have to write a book in order to answer them. Now take the question that was suggested here some time ago, on anatomy. How would any candidate know how far it was the intention of the examiner that he should go in his answer? Does a candidate know what the state board wants when he is asked to describe the lungs, liver and heart of a horse? How is a candidate going to know what is wanted? He could answer the question in a half-dozen ways. I maintain, Mr. President, that the question should be concise and explicit, so as to be comprehensible, and I maintain that the most difficult part of a state board examination is the wording of the questions. I would like to see the state boards come together and agree upon a certain form for questions, and not try to cover the whole subject by any one question. Such a method is ridiculous. Instead of asking ten questions in anatomy, I would be satisfied with three, providing those three were framed in such a way as to draw out a fair idea of the candidate's knowledge, the same as the Bureau of Animal Industry does. Then, so far as their questions relating to meat inspection are concerned, they are based upon the same principle. You all know that they want general practitioners. They want well-qualified veterinarians. They do not want specialists, and that is the reason they give theory and practice 30 per cent. They don't want specialists. I hope, Mr. President, that this motion will go through. There is certainly a field for study here, and a great deal of knowledge of a beneficial character could be obtained through the work of a good committee.

Dr. Gill: I maintain that any examiner who cannot ask questions is not fit to be an examiner. Any man who understands a subject and cannot ask questions upon it properly ought not to undertake to act as an examiner.

Dr. Murphey: I just want to ask one thing more. I do not want to be put in the position of criticising their work, because I am not criticising it. I certainly admire the work that they have done; but I also realize that there are certain problems in the practice of veterinary science that are not found on the killing floor, or in the retention-room, nor are they found in the general quarantine, and that phase of the work is separate and distinct from that which the veterinary examination boards have to deal with.

A Member: I do not understand just what is called for. I wish the chair would explain just what the motion is that we are asked to vote on.

Dr. Hoskins: I think the President in his address made the lines on which he thought this information might be obtained, and be of some service to us, very clear, indeed. I think if you will take up his address and take these two propositions that he made and act upon them as he made them, we will then arrive at some definite idea of what we are going to vote upon, and we will have something as the result of the work of the committee. Those two propositions also give a very clear idea of what difficulties we are obliged to contend with.

The President: I think Dr. Murphey included that phase of it, but he perhaps did not state it very clearly.

Dr. Helmer: I have in my hands a copy of the President's address, and in order to make his idea clear, I will read from it his recommendations as to the functions of such a committee. (Dr. Helmer reads from President Stewart's address.)

A Member: I should think, Mr. President, that the first committee provided for in that recommendation could not report until it had information which the second committee was appointed to collect.

Dr. Babson: I would like to call your attention to the fact that there being an examination for non-graduates, men will attempt to commercialize these questions. I think we have been looking forward to the time when we could eliminate the examination of non-graduates entirely. They are men who have no clinical experience, and there is nothing to prevent them from going into states where we have no practical examination.

Dr. Stewart: I think as far as that is concerned, if the next set of questions was framed entirely different, some applicants that had learned the answers to the previous questions would be just as feeble as though they had never tried the first. I do not believe that we can get away from some publication of this material if we are going to strengthen ourselves, and it seems to me that the possibility of their reading over the set of questions is of small moment in comparison to the benefit that such a publication would be to ourselves.

Dr. Babson: In Massachusetts we, of course, try to get up a fair set of questions, but year after year, we find it a very difficult matter to get up sets of questions which do not to some extent at least repeat. We try to be very careful of our questions, to see that no publication of them in any way takes place. If this motion goes through, the committee is appointed, and the questions are asked for and obtained, I would like to ask the committee into whose hands such questions go to be very careful on that line.

Dr. Boor: I would like to confirm what the doctor has just stated with reference to these questions. That is, they may make a commercial proposition out of it. They might sell them to students, both graduates and non-graduates, and wherever they could sell them. It seems to me that there is a danger there which needs to be safeguarded, and I do not want to enter into anything of that kind.

Dr. Babson: I have refused two applications.

The President: Gentlemen, you have heard this debate. It seems to me that the matter has been fully covered. Are you ready for the question?

Dr. Gill: Mr. President, it seems to me that this is an opportune time to make a suggestion, and, I think, apropos to the question. I have always been in favor of having the examination made at the college. Why could not a board of examiners examine a student right at the college? I do not see any reason why that cannot be done, or why a properly constituted legal board of examiners could not go to the various schools and there examine all the students; so kill two birds with the one stone. It would relieve the professors of a lot of responsibility. Now if they would do that at the time of the examinations of the schools, they would get in touch with the teachers, they could compare the questions and answers, and then the teachers and those interested would know whether the questions were fair. I simply offer this as a suggestion, because it seems to me that inasmuch as the state must finally and ultimately legalize the graduate to practice, we ought to do the whole business and get everybody together because it would be much more satisfactory.

The President: The committee might take that into consideration in conducting their investigation. It is a very good suggestion. Now is there any further debate upon this motion? If not I will put it to a vote. Those in favor of the motion will please manifest it by saying, "aye." Those opposed, "no." The "ayes" have it.

I believe the author of the next paper is not here. The paper is by Dr. W. L. West, of Belfast, Me. I understand that Dr. West has sent his paper here, and it will be read by Dr. Murch. He is a member of the board of which Dr. West is also a member.

OPPORTUNITIES OF EXAMINING BOARDS TO UPLIFT THE PROFESSION

By W. L. West
Belfast, Maine

Mr. President and Members of the Association: The splendid chances for examining boards to do good to the profession are along many and varied lines and may be grouped under several headings.

Examining Boards and Politics. Politics seem to be the bete noir of examining boards, and why? If by politics is meant the common or garden variety, which means the methods of the ward heeler and the no less reprehensible boss, then the less the boards have to do with politics the better for the boards.

But there are politics and politics. I believe it is the civic duty of each member of an examining board to do his part in purifying and filtering the politics of his section of the influences which are detrimental to honest and upright government and to purge the community of unjust and unfair political parasites, as much as it is his duty to eradicate other smaller but no less obnoxious parasites of which he is more cognizant.

If each member of each board, and in fact every member of the profession, would interest himself in politics and uphold that which he knows to be right, honest and just, regardless of party name or political label, and work the destruction of sand-bag, subterranean politicians, an influence can and will be exerted which will raise the profession to high levels by securing for us recognition and attention to our demands where otherwise we could hardly hope to obtain it.

Go to the primaries, use your voice and pen in the interests of public morality and civic righteousness, work face to face with the voters and let them know where you stand and that you are a professional man who is interested in the welfare of your community and that you represent the most humane, honest and scientific profession on earth.

Examining boards may shape, initiate and develop remedial and constructive legislation for the profession if the members will work consistently and persistently for these ends.

Get yourself elected to the legislature or assembly, serve on your town or county committee, and don't consider that it is unethical or beneath your dignity to make an occasional speech.

The profession by the right of its members through their scientific training and their practical knowledge of affairs, the fact that they have constant dealings with the best elements of the community, can do a wonderful work if each member will do his share. Will you do yours?

EXAMINING BOARDS AND COLLEGES. It seems to me that it is clearly within the province of the examining boards to supervise and suggest needed changes in the curriculum of the colleges; to demand a certain definite minimum matriculation examination; to see that all colleges which expect recognition from the boards maintain a properly educated teaching staff of sufficient numbers and character which will enable them to furnish to and require of their graduates a sound scientific and practical education. That they be compelled to furnish to the students an abundance of clinical material and the students be compelled to actually do the different operations under competent supervision, which in addition to their scientific training will enable them, when they are sent out to engage in practice, to not only secure a lucrative practice but to appear like professional men who know their profession and to be a credit to their alma mater.

EXAMINING BOARDS AND THE RECENT GRADUATE. Members of examining boards can do a great deal for recent graduates. I think it is a duty we owe the profession to use our best efforts to get each honest man who enters the profession located where he can do good work and secure the proper amount of remuneration for the same.

There is no good reason why recent graduates should not be advised and directed by members of the boards as to where there are good openings, as to how to open an office, how to approach their clientele, what fees to charge for certain things, and generally to furnish them with the information which we of the more pioneer type were compelled to acquire by hard and costly experience.

EXAMINING BOARDS AND ILLEGAL PRACTITIONERS. This variety of parasites has no standing with my board and should have none with any. I have adopted a method which has so far worked very well. I send them a friendly notice, enclose a copy of the law, and assure them that I presume they are unaware of the fact that they are practising illegally, but that they must desist at once or it will become our painful duty to bring all the forces of law at the state's command to bear upon their cases with the most dire and unfortunate results for them. In most cases this works. In fact, we have not as yet had a case, to my knowledge, where it has not been effectual.

Reciprocity between Examining Boards. I am a firm believer in reciprocity for examining boards, as it is certainly a great hardship for a man who has practised in one state for a long time and who earlier in life, when his knowledge was fresher and more available, passed a creditable examination, to be compelled if for any cause he must remove to a distant state to take another examination.

Care in the Proper Framing of Questions. Nothing to my mind requires the amount of earnest thought on the part of an examiner as does the proper framing of the questions he wishes to ask. A question may be asked so blindly that the student has and can have no conception of what answer is desired, notwithstanding the fact that he may know the subject thoroughly. On the other hand, a question may be put so that the answer is instantly known by the student. This, of course, is to be avoided. The happy medium is secured when the question as given asks one thing and requires one definite answer, which if the student is familiar with the subject the correct answer, and that alone, at once sails into his mind.

The President: Gentlemen, you have heard this paper. It has been arranged for Dr. Archibald, of California, to open the discussion. Dr. Archibald does not appear to be here. The others assigned to discuss the paper were Dr. Thomas Frazier, of Richmond, Va., and Dr. Cook, of Cincinnati. It does not appear that any of the three gentlemen are here, and the debate on the paper is therefore open to the members present. I would be pleased to have someone open the discussion of this paper.

Dr. Baker: Mr. President, I think some of the points Dr. West has made in his paper are very good, especially the one alluding to politics. Various state boards are politically organized and you cannot get away from it. The members are appointed on account of their political pull and influence and very seldom on account of their attainments in the profession. I do not wish to cast any reflections on the appointing powers of the various state boards, but I do contend that the best men in the state are not generally selected. I do not think the appointing power in the various states questions or examines the ability of the appointees who represent the state on these various boards sufficiently, and consequently there ought to be a general outline of suitable questions; perhaps not so much with reference to the matter of the questions themselves, but to the method of forming the questions. That is what Dr. West alluded to. He acknowledges that it is a difficult matter to frame the questions properly. He found it difficult, and every other conscientious man must certainly have found the same thing which we examiners in the colleges often find ourselves. I have often debated for some time over the form of a question. A question has got to be clothed properly in phraseology that is comprehensible and yet comprehensive.

So far as politics is concerned in the various state boards, as they are changed from time to time more or less, it seems to me that if a simple set of questions could be adopted by this organization as a guide to the veterinary boards it would be a solution of the whole difficulty. I think every school attempts at least to teach every branch of veterinary science ordinarily covered in college courses, but it may be weak in some particular branch. Every school is probably so in some points. Of course, it follows that when a student appears for an examination on a subject where the school which he comes from is weak, he will naturally be weak in his answers. Furthermore, as intimated by Dr. Gill, in his remarks the prejudice of an examiner may come into play, or his idea of correctness of what the answer should be to a certain question. One examiner might regard it one thing, another another. One examiner might consider such an answer correct, and the student might be scored fifty, or possibly be given zero by some other examiner who had a different notion about it. If we could arrive at a lot of properly constructed questions the various boards would have a basis or a guide to use in the formation of their own questions, and could more accurately and fairly judge of the answers to them.

Dr. Maloney: As to that question regarding the character of answers, Mr. Chairman, I do not know that I can quite agree with the gentleman who has just spoken. It seems to me that the board of examiners and the college must examine the student from different view-points. I do not understand that the college will have the right to examine men that they have not taught, and yet another school may have taught that particular subject, and may regard the questions as proper questions for the examiners of the state board to ask.

Dr. Baker: I don't think the gentleman understood me.

Dr. Maloney: That is what I gathered from your remarks. Furthermore, Mr. Chairman, I want to take issue with Dr. Baker when he says that the state boards are always political bodies and appointed for some political purpose. I would like to have him point out some specific board that he knows of that has been appointed in that way. Our board in Massachusetts has always contained four men known to be Republicans, and one to be a Democrat, all of which have been appointed and reappointed without regard to politics so far as I know, and so far as our state board is concerned, we ought to be excepted from that criticism.

Dr. Knowles: Along the same lines that Dr. Maloney has just referred to, I would like to say, that so far as the board of examiners in Montana are concerned, I do not think that remark applies to us. While it is true the Governor makes appointments, he makes them by recommendations made by the State Veterinary Medical Association. The Association is required to give two names or as many candidates as are to be appointed before the next annual meeting. Those are to fill vacancies which will occur. The Governor is required to choose from those two.

As to the question system adopted by the Montana board in asking questions, we have adopted a system which, we believe, is a good one, and I do not understand that we would have to depart from that if this plan which has been discussed here today went through. As a matter of fact, we ask a number of questions and give a candidate the privilege of answering a definite per cent. of them. In that way it gives him a better opportunity to pass the examination than he would have if he was required to make an average of 80 per cent., or whatever it might be, on the whole examination, and at the same time I think we are able to get just as good an idea of the candidate's general qualifications for practice. In our opinion the board's function is to determine whether a candidate has the qualifications to serve the state in the capacity that the state requires, and not what the candidate may know of the technicalities required by any college in their courses of study.

Dr. Murch: I am very sorry, Mr. President, that the impression that the state board was appointed under political influences seems to have been gathered from that paper. I will say for the state of Maine, inasmuch as I represent that state, that the Governor appoints the board of veterinary examiners on a recommendation made from the Maine State Veterinary Association. The appointment is always made in that way. I never knew it to be done differently. I would say, so far as Maine is concerned, these appointments are not at all controlled by politics.

Dr. Lowe: If I may be permitted, I would like to say a word about this matter. From the standpoint of New Jersey practice it is proper that I should, being the author of the law regulating the practice of veterinary medicine in that state, which was passed in 1902. The then Governor appointed me a member of the board, and all of the succeeding governors during which time I have been an executive officer of that board. During the period of ten years that I was connected with that board I know that politics did not determine or influence the board, pro or con, one way or the other, or in any of the results that were attained. We tried to be fair and we tried to be practical. We tried to serve the interests of all concerned. Of course we recognized the fact that we had a duty to perform, to the state, because we were appointed by the state. We recognized also that we had a duty also to perform to our profession, and we recognized that we had a duty toward the young men who appeared before us. Of course it was effective, and all of us knew that men in different institutions in different parts of the country, or of the continent, would naturally present different qualifications. During my ten years' service on that board I was able to tell before the examinations, if I knew where an applicant came from, where he would be strong and also pretty nearly along what lines he would be apt to be weak.

I make this statement just to say a word in behalf of our board, because I would not want to have it go out that politics dominated our board. So far as the performance of our duty was concerned, I think I can speak definitely and emphatically on that. We never allowed any politics to enter into it. We were simply asked to do our duty, and we tried to do it in that threefold capacity to the applicant, state and the profession. Of course we know this thing is to be looked at from different angles. We know that those who are teachers must look at it from a standpoint somewhat different from that of a member of an examination board. The two must necessarily look at it from different angles—as to whether an applicant is qualified to practice in the state in which he desires to obtain a license; in New Jersey we have tried to conduct our examinations in such a way as to form a test of both the theoretical and practical knowledge of an applicant. In the main we have tried to require practical tests.

Dr. Hughes: During the time that you were a member of the board was there a single Democrat appointed upon it?

Dr. Lowe: There was on the original board.

Dr. Hughes: Under a Democratic or a Republican Governor?

Dr. Lowe: Under a Republican Governor.

Dr. Hughes: What is the political complexion of your board?

Dr. Lowe: I do not know what the politics of the board is.

Dr. Hughes: Is there a single Democrat on that board today?

Dr. Lowe: I think there is, but I will not be certain about that. I am not a member of the board now. I served for ten years.

Dr. Knowles: May I call attention to one other point, and that is the system of conducting or making the examination? The system which was adopted by us was suggested by Dr. Taylor. It was readily accepted. It was that the papers of the candidate should not be known to the members of the board. We adopted the system of having candidates file their applications and write their names on a card and then take a number. Those are then filed with the clerk outside of our board, and instead of putting their name on their examination, they put their number on. In that way the examination papers are handed in and none of the members of the board know whose papers they are. We found that that system was more just to the candidates because we would not know whose papers we were reading or from what school they were. It was much fairer in our opinion to conduct it in that manner, rather than to have the candidates put their names upon the papers or the school from which they came.

A Member: I think the whole key to this situation lies in getting the proper men on the examination boards. It seems to me that that is where the whole of the confusion lies. If the examiners themselves are not in sufficient training to become good examiners we cannot expect uniformly good results. I am convinced after listening to this discussion, Mr. Chairman, that there is a problem here that we should try earnestly to solve.

DR. GILL: There are always two sides to every question. I take the other side and I would like to speak on that side again. Now it seems to me that a good, uniform set of questions and text-books should be adopted generally in all of the veterinary schools. That would simplify the asking of questions very much indeed. The government might prepare one on meat inspection. I think the best plan is to adopt a text-book. I find that I can get more knowledge into a student by that method than in any other way. Will each and every college adopt the same kind of text-book, the same on anatomy, the same nomenclature, the same text-book on physiology, and the same on meat inspection? Then we can give the graduate who is being examined a fair chance, because then he knows whether he answers the questions properly or not. After the examination is over he can look back in his book and find out. The answers must be alike. Of course no two men will word the answers just alike, but with slight variations the answers will be substantially the same.

Now I want to give you another illustration of what happened in one of our examinations recently. One of the examined was asked to draw a diagram for a biologic test. When he turned it in, it was marked zero, which cut him out. It kept him below the maximum percentage for passing. He took his test back, and, after looking it up, they found he was right, and they had to correct it. That examiner did not know. Adopt text-books, and you will have, in my opinion, the solution to the whole problem. Let the examiners select their questions from the text-books. Then, with the knowledge which they have from the books, with the information which they receive from the teachers, the candidates for examination will have a fair chance.

DR. BABSON: Someone has said that among many men you will find many minds. That seems to be the case today, and it is very interesting to be here and hear remarks similar to the last. They bear weight, but I wish once more to call attention to the fact that one speaker here has said that the members of examination boards are appointed by politics. As I remember, he stated that they are seldom fitted for their work. If he wishes to state that as a fact, and is willing to back up any such statement as that, I certainly wish to be regarded as challenging it in every respect. If it is merely an opinion, then it is all right.

DR. HUGHES: Mr. Chairman, I merely want to say, or to elaborate for a moment on Dr. Gill's statement. If all do use the same text-book, why not use the same forces, teaching the same, and allowing an interchange of students from school to school, instead of the horrible mixup that we have now? Incidently, I want to ask the chairman to call upon my good friend, Dr. Cooley, who I believe is on the state board in Ohio, and ask him to tell us if politics has entered into its existence.

THE PRESIDENT: We should be very glad to hear from Dr. Cooley.

DR. COOLEY: Mr. Chairman, I did not know that I was to be asked to approach this question in that way, but as president of the state organization in Ohio I have been in close touch with the situation. We have had a lot to do there with creating an agricultural commission. This agricultural commission is appointed by the Governor, but one member is appointed by the State University trustees. The commission has now been selected and appointed. I could give you the names, if that is desired. Dr. Samuels is the new chairman of the commission, the representative of the dairy and food interests and Dr. Press, of the Agricultural Department of the University, also Dr. Woodson, from the Experimental Station, are members. So in going to Columbus at different times I have come in contact with Dr. Samuels and have tried to frame up something which was satisfactory to the profession in the state of Ohio. This commission is not related to the State Board of Veterinary Examiners. It wipes it out. To give you the whole thing, Dr. Cook, who was connected with the Cincinnati school, came up to Columbus. He is a senator in the senate of Ohio. He wished to do away with the live-stock commission and create a sanitary board, but the law he favored in Ohio was very radical, so that the farmers and stock-raisers began to get after the veterinary profession and call them "grafters" and everything else. I had to go down there and see what I could do to protect the profession. After that everything that was offered by Dr. Cook was beaten. They would not stand for it, because of the radical law that he had proposed. There was a point in the law which was passed, to the effect that they dropped out defining the qualifications of the examining boards. In other words, it looked to me that each and every member might come in and might be able to appoint a veterinarian who had obtained a state license by affidavit whether he was a graduate or not. It was objectionable to me, and I prevailed upon Senator Cunningham, chairman of the committee, and Dr. Brown, from Ashland, chairman of the Agricultural Committee in the house, to put into the bill a provision that examiners shall be graduates of a recognized veterinary school, and be also men of character. They put that into the law and it is in there now. Politics certainly got into it to some extent in Ohio.

THE PRESIDENT: Is there any further discussion on this paper? It is now five o'clock, and I think the other sections have already adjourned.

DR. MALONEY: Move that we adjourn.

Motion seconded and passed.

The Section declared adjourned until Tuesday, September 2, at two o'clock.

TUESDAY AFTERNOON, September 2, 1913

PRESIDENT STEWART: The first business this afternoon is committee reports. If there is no committee ready to report, we will proceed with the reading of the papers. Last night we left over a paper by Dr. Longely as the first thing to be read today, and his colleague in California, Dr. Archibald, has agreed to read this paper for us. I will call upon Dr. Archibald to read that paper now.

DR. ARCHIBALD: Mr. President and Gentlemen: The President has stated the author of this paper. I have not really had an opportunity of reading it over, but the title is "Making State Board Examinations to Be both Practical and Fully Representative of Modern Medicine."

MAKING THE EXAMINATIONS TO BE BOTH PRACTICAL AND FULLY REPRESENTATIVE OF MODERN MEDICINE

By Otis A. Longley
Fresno, California

Our worthy President has requested that I respond to the above subject, and as it embodies a theme that should be deliberated by this body I will endeavor to open discussion upon the thought expressed, trusting that my efforts may lead to some definite decision and assist in improving, if possible, the methods now in use by the state boards of examiners.

Let me repeat the sentence comprising the subject before us: "Making the Examinations to Be both Practical and Fully Representative of Modern Medicine." Now there is contained therein a very bone of contention, for there are many who declare that an examination along modern medical lines is not practical. To any earnest thinker or one keeping pace with the rapid advances of modern medicine it is apparent that biology and biological products occupy the important position. Therefore it is necessary to successfully practice in this age for one to have a proper knowledge of biology, otherwise he can lay no claim to the title "modern." Is it wrong then or impractical for state boards to include questions in their examinations that deal directly with biology and biological products? Most assuredly it is not, for the proper knowledge of biology is the practical side of modern medicine.

Very plainly I state that it is not necessary, nor should state boards expect, that applicants have an intricate knowledge of the preparation of biological products, but they should know what each one is and have a general idea of its preparation. The same can be said of fluidextracts or other pharmaceutical preparations. No one expects a veterinarian to be able to make a fluidextract, but certainly he should know from what it is made and how.

What is the profession going to do with the veterinarian, a graduate having a modern education, who in answer to the question, "What is mallein," says, "A serum containing live bacillus of mallei." Is it fair to permit this man to practise beside the earnest, hardworking veterinarian who has studied hard and mastered biology? The question is both practical and modern. Many old practitioners who went into practice before biology was taught could answer it correctly. Should not the man with a modern education answer it? I am not saying this to ridicule applicants; it is a serious proposition, for the question "What is mallein" or "What is tuberculin" is asked many times by the layman. He is entitled to be told and told correctly, and yet is not in a position to judge as to who is giving the correct answer. He is just as likely to discredit the man who knows as the one who does not. This is happening every day. Besides, no man can practically apply modern medicine without a proper knowledge of its composition and action. Is it not practical, then, that the state boards require that applicants have a working knowledge of biology?

Another construction can be placed upon the subject sentence of this paper. The word "practical" could be used to mean a practical physical demonstration of the abilities of an applicant to practise veterinary medicine and surgery. It would not be at all easy for state board members to arrange to have fit subjects for practical demonstration at each examination, especially in view of the fact that we all work without compensation and with our expense account on the wrong side of the ledger.

Arrangements might be made to have all applicants spend a few days with the members of the boards who are in general practice, but unless a considerable time was spent in this way it would hardly be fair to the applicant, owing to lack of sufficient variety. From the standpoint of the applicant this would not be a practical procedure, neither would it be practical to require that applicants pick and furnish their own subjects for such demonstration.

The subject therefore concentrates itself into the one fact, that to be practical the examination shall be both written and oral, and that the questions shall cover all branches of veterinary science and be as practicable as possible. If an applicant can answer his questions in a practical manner, he is or will be a practical man, and by giving questions on all subjects pertaining to veterinary science the board is being fair, and such a procedure would permit of the applicant making a fair general average. If he is not proficient in one or two subjects his general average would not be so seriously affected as when the questions are few in number. Also this procedure allows of the examiners being fair and just in their decisions.

To give a physical demonstration of one's ability, as a part of regular examinations, would place the applicant in the unfair position of being judged by practitioners who may have another way of doing the same thing and believe the other to be wrong. This would be more marked in a physical demonstration than in a written examination.

Were it practical for boards to furnish subjects for demonstrations from applicants, the idea would not be amiss, but an expense account would have to be provided in order to carry it out and that would be impossible to obtain in all states.

The California board, in their efforts to have their examinations "practical and fully representative of modern medicine," have adopted a complete set of rules for governing examinations, a copy of which is attached hereto.

The several states are now widely separated in the matter of educational standards and requirements for the right to practise. No real advancement can be practically made toward a uniform standard until the several practice acts are made uniform the examinations unified and a national board selected to govern reciprocity of license. When all states require a diploma from a legally chartered, recognized, three-year college; a practical written examination covering all branches of veterinary science that will be representative of modern medicine, then reciprocity will take care of itself.

I did not intend to switch off on to reciprocity, but wanted to emphasize that the first thing to be done is to adopt some system whereby the several laws will be uniform and all examinations representative of the title of this paper.

RULES GOVERNING EXAMINATIONS GIVEN BY THE CALIFORNIA STATE BOARD OF EXAMINERS IN VETERINARY MEDICINE

1. Two to five questions are to be prepared in each of the following subjects: Anatomy, surgery, theory and practice, physiology, pathology, bacteriology, biology, materia medica, chemistry, pharmacy, toxicology, obstetrics, contagious and infectious diseases, meat and milk inspection and dentistry.

2. A portion of these subjects is to be selected and allotted to the several members of the board by the secretary at least thirty days prior to the date of the examination; the members to prepare the questions on the subjects allotted to them and return same to the secretary at least ten days prior to the date of the examination. The secretary is to compile the questions sent to him and prepare copies of same for giving the examination and furnish paper for the answers to be written on.

3. The meetings of the board are to occupy two days; the first day to be devoted to the written examination; the second day the orals are to be given and the business meeting of the board held, except when a small class is before the board and when same can be done efficiently in one day.

4. At least ten days prior to the date of the examination the president shall designate one member of the board to receive credentials of applicants and conduct the written examination. For the second day's meeting a quorum must be present.

5. Examination papers are to be graded as follows: Each member is to grade the answers to questions prepared by him, marking plainly opposite each answer as defined in Section 8. Said grades are to be submitted to the secretary, who shall compile same and submit the results to the president, who in turn shall notify the secretary as to which applicants are entitled to licenses to practice veterinary medicine in the state of California.

6. Immediately upon receiving instructions from the president, the secretary shall notify applicants of the results of the examinations, and shall as soon as possible prepare and forward licenses to the successful candidates.

7. Each separate question shall be graded on the basis of 100 credits. A total of at least 70 credits shall be necessary for passing an applicant (averaging all markings).

8. Examination papers are to be treated as public documents, be kept on file by the secretary and open to inspection at all times.

Dr. Archibald: I might explain, in regard to a quorum, that our state is such a large state, 1000 miles from one end to the other, and endeavoring to have a meeting alternately in the north and south, is quite a burden on some of the members to travel from one end of the state to the other and spend several days at either end, and it is only by selecting some one (say the meeting was to be held in the north), selecting a member in the north to start the examinations, then the other members would come in and complete the work in a day and go back home.

Dr. Stewart: Gentlemen, you have heard the reading of Dr. Longley's paper. There were some designations as to who should open the discussion on this paper. Of those so designated none are present, I believe. Perhaps there is someone here from Louisiana.

Dr. Douglass: I have the honor to represent the board of Louisiana, and Dr. Goodwin has asked me to attend he reading of this paper. "Making the Examination both Practical and Fully Representative of Modern Medicine," is just what we believe in down in Louisiana.

We are very unfortunately situated down there, it being a very hot country and a very damp country. We have no winters, and the consequence is that when disease is once introduced in that country it is almost impossible to eliminate it, hence we must have men capable of eliminating or controlling infectious diseases, and that brings in modern medicine, especially biology. Anthrax is so prevalent that we cannot turn out cattle with safety on any pasture. You can turn out forty, and then turn out ten in the same pasture to mingle with them, and probably ten will die. You can safely say eight will die.

We have regular examinations, and we must have young men that understand biology and modern medicine, and we always try to include that in our examinations. Now I just want to say one word about the discussion yesterday about the state boards being political. In defence of our Louisiana board, our law says that the Governor *shall* appoint four members who are members of the state association and recommended by the state association. We therefore hold an election in our state meetings; every man puts down the name of four men that he would prefer to be on the board. A teller is appointed, the votes tabulated and the names of the four men receiving the largest number of votes are sent to the Governor, and he always appoints those four men, so we have no politics in Louisiana.

The young man coming from college today of course must have some practical knowledge of medicine, but we require in Louisiana, more than anything else, that he must be up on modern medicine to help us control the awful contagious diseases that we have there, such as meningitis, blackleg, tetanus, hydrophobia, tuberculosis, etc. We have 2000 tuberculous cows in New Orleans giving milk, we have got enough ordinary men down there, of which I happen to be one, but we are looking in New Orleans, or in Louisiana rather, for young men, not only practical men, but young men that are up on modern medicine.

Dr. Stewart: I don't see Dr. Schuh, of Grand Rapids, who is down on the program as the next speaker in the discussion. Is there anyone here representing the Grand Rapids faculty? Dr. Adams said he was so engaged he didn't see how he could be here, so I suppose there is no representative of the faculty of which he is a member. The question is now open for general discussion. Gentlemen, this is a field of importance, in examinations, and a field of diverging notions; however, my personal experience in examining students has revealed to me that there are some men who have a peculiar capacity to remember what the book says, and what the instructor says, and can repeat in language very closely that which he has read or heard, and he contents himself, insofar as he may, with that sort of knowledge, memory knowledge. There are others who have a very considerable faculty of committing things to memory. He can tell you how to drench a horse, or to administer a bolus, but when it comes to doing it he would fail. He can tell you just how to take the temperature of a horse, but he could not insert the thermometer without considerable difficulty. He even knows exactly about the passing of a catheter, but he could not do it in actual practice. Now this has been referred to along this general sort of line. There are men who can tell you just what medicine ought to be given, but if they are looking at it they would not recognize it and have no knowledge of even some of the more common things. I have examined young men in anatomy, when I was doing a little teaching along that line, or rather assisting a man who was in that line, and I would ask a man just where, for instance, the parotid gland was in a horse. He might come within twelve inches of the exact location, but yet know its purpose. I have seen many and many such a misunderstanding of the practical facts where the student was largely one who depended upon the book knowledge.

In our institution, in the study of anatomy, we insist upon going to the animal, and the man shall demonstrate actually where, or as near where as the conditions admit, the organs are, about which he is being interrogated. And in medicine we like to get the medicinal substance itself to see if he knows the difference between epsom salts and quinine as he looks at it. So far as possible we make the effort to qualify the man on all sides of his knowledge, looking upon that as being a practical training of the man.

Whether it is possible or not for examining boards to incorporate in their examination something of this character, not perhaps covering everything, but something on this practical application side is an open question. Some members and some boards have said, "Oh, we just think written examinations are adequate!" and other boards have said, "We believe more in the oral examination than we do in the written." And some will say, "Here's a horse that there is something wrong with its foot; does this fellow know how to pick up a horse's foot? Does he know how to pull off a shoe? Does he know the first thing about it?" In teaching students we discovered that considerable training was needed in order to know how to pick up a horse's foot properly, even though they have seen others do it a great many times. The young man makes his blunders from the lack of real practical knowledge. It is an open question whether the examining boards should not demand of the colleges that they give the young men who ar graduated from those institutions some training along these particular lines, so when they go out they will not disgust the client who has had experience or the man who knows in a practical way. Teach the young man so that when he comes out he won't display his ignorance. He won't go near a horse for fear he will get bit, or show he don't know how to pick up the foot, or any other such thing that really tests his practical knowledge. I hope when we get through with the examination as to fitness this feature will be the feature of your discussion and examination.

Dr. Fox: What would be your decision, for instance: Suppose a man came up for examination and did not know any of the things you have just mentioned. He might be a very intelligent young man, and he might be able to answer our questions, and even if you talked to him on the subject of practice, he would give you a splendid idea that he was thoroughly posted. You might give him a position as assistant to you in your private practice; but when you set this man to work in the morning and tell him to go and lead a horse out of the stall, perhaps he would not know how to do that; he might not know how to back him out of the stall; he wouldn't know how to do it without hurting himself, ask him to pick up a horse's foot and he would know no more about that?

Dr. Stewart: I don't believe that man is ready to enter upon practice.

Dr. Fox: How is he going to get ready?

Dr. Stewart: He ought to learn some of those things before he gets a license.

Dr. Fox: Suppose he has been a clerk in a store; suppose he has some trade other than the veterinary profession, for instance, a tailor, and made up his mind that he wanted to study for the veterinary profession. He studies and graduates probably with honors from his college. You cannot turn him down. When you start him in your practice he cannot drive a horse hitched to a buggy out of a twelve-foot door without hitting the door. Those are things I have seen in my own place; a very intelligent young man and as nice a man as ever lived. When it came to any questions you might wish to ask him, he was there and could answer almost any question you could ask him; but he was afraid of a horse; he wouldn't go near a horse's head, he wouldn't even try to do so. Now if he was called out in a case in actual practice and acted that way, it would imply he was scared of this horse and didn't know what he was doing, and the client would naturally lose confidence in him right there, no matter if he was as bright a young man as ever went into practice. At the same time he was not sufficiently qualified for handling horses to know how to take hold of a horse. Now, what are you going to do; where is he going to learn these things unless you start him in business? This man was a tailor before he entered college; where is he going to learn this business? Is he going onto a farm two or three years before he starts to practise his profession? It is, I suppose, up to the man that gives him a position to teach him the practical things. I cannot see any other way out of it. Some of them make very good men after a while, very good men. They have got to get this practice from somewhere, and I don't know how they are going to get it any other way.

Dr. Hoskins: Mr. Chairman, the question before the house is certainly a very interesting one, and probably was covered in a way that perhaps we did not observe, at least we hope it was covered, by the recommendation that came from the chairman this morning from the Committee on Intelligence and Education. That provided that there should be a four years' course in the field of veterinary science.

Now I go back to the day that Dr. Huidekoper, who was probably one of the foremost men in veterinary science, and I remember very well his views on that subject, remembering it especially in view of the remarks just made, and his thought then was, and that is more than twenty-five years ago, that the first year of the veterinary course should be to test out the fitness of the man to enter veterinary science, and that, so far as those studies that are applied strictly to the science of veterinary medicine, all of those should be left aside to be entered upon the second year.

The first year should be a year of training in horsemanship, in the handling of horses, in getting acquainted with animals, and in knowing how to harness them, in knowing how to be able to take a harness off, to take them apart, and put them back again; to be able to know how to care for a harness and how to care for horses, even to the grooming of them, the feeding and handling of them and the shoeing of them, and all those points that are so very essential for the success of the man if he happens to start out right into practice from the school.

In regard to what has been said here, I have had a similar experience with men that stood very high in their college record and with men that had won some of the prizes. I have taken them in my hospital and I have been astounded beyond measure at the absolute lack of any practical knowledge that these men had of even walking into a stall with a horse and properly backing him out, or handling him, or of even talking at all to their clients. One of the things that they lack very materially indeed is this kind of knowledge. It should not be the province of the practitioner who wants an assistant to teach him. It should not be his duty. It is the province, however, of the school that gives him a finished education, to teach him those essential things that he ought to have known before he took up any of the really scientific problems. That year would be a year to test out whether that man should go on and take up veterinary science, whether he had the personal equipment, or whether he had the natural ability that a man ought to have to enter upon so practical a science as that of veterinary medicine. So I recall with a great deal of pleasure the thoughts of Dr. Huidekoper along that subject more than twenty-five years ago.

Dr. Lynch: I believe that one of the first things that a young man wants to learn is animal nature. It is one of the things that makes a young man who is accustomed to animals, horses, cows and animals in general, a better man for the profession. For instance, a man who is a horseman takes it into his head to become a veterinary surgeon. If he has education enough, he can, in a very short time, accomplish quite enough to make his client understand that he thoroughly understands his business in the way in which he takes hold and handles the animal.

Dr. Stewart: Is it going to be practical for the examining boards to exact of the applicant for a license that they shall bring evidence or knowledge of that kind?

Dr. Lynch: It is in some states. In our state of Maine, for instance, and I believe they have much the same conditions in Vermont, Massachusetts and New Hampshire, those are important things. Of course it is unfortunate for the veterinary surgeon if he cannot impress his client with the fact that he understands his business. That we cannot help; but a man going into general practice ought to know something of animal nature. We do not ask questions of the men along those lines, but the man that understands animals does not have much trouble to get along. If you have a tailor, a barber, a stonemason, or some other tradesmen who wants to learn the veterinary profession later in life, he has a hard road to travel. There are a great many, I will admit, that take their college course and get by with honors, even with medals, that are a failure after they come out.

Dr. Stewart: To those who did not hear this paper, I want to say it was directed to the question of making the state board examinations to be both practical and fully representative of modern medicine, and advanced these thoughts, how those examinations are going to be practical, in what direction the practicability shall extend in the examination. Let us confine our discussion to that feature of it.

Dr. Knowles: Mr. Chairman, as I see it, the paper and the discussion lead to this point, that examining boards must be standardized. Colleges are standardized. I know that from the investigation by two regular committees. Now it seems that it would become necessary for the examining boards to become standardized, in order that they may have a uniform system of holding examinations, and if this system of holding examinations brings into use something that is not being taught by the colleges, or by some of the colleges up to the present time, the colleges would undoubtedly meet those requirements.

Now, if it is not intruding, I wish to just remark about the four-year course, and the reason I wish to do so is because I had an illustration with the four-year course, that it does not meet the requirements. For instance, a young man came to Montana who had taken the four-year course; he was thoroughly conversant in biology and could make the tuberculin and the mallein tests by the book; he said his education was four years of nine months each in the school, and yet this young man lacked that practical application of the knowledge we have just been speaking of. He was not able to go into practice and make a success of it. He said that his training along the handling of animals had been almost nil, that he was afraid to approach a horse; he knew nothing about cattle, and the result was that he took up private practice with an elderly practitioner.

Dr. Clark: Mr. Chairman, the examiner has a difficult time when he has applicants from three or four different schools, and when he comes to mark some of his papers he finds written across the page, "I don't know, I never held a post-mortem," or, "I don't know, we were never taught anything about poultry." Now down in our section, the same as it is in Louisiana and some of those other big states, we have a great many infectious diseases, and you all know they are very closely allied to each other. You find three or four cows dead, or three or four mules or horses dead, and you must do some post-mortem work. I have been very much taken back when telephoned to and asked to come over there to some farmer, and find a young man there, or some young men, and they say they cannot make a post-mortem, and I have to show them how to do it. I have had three or four in the examination this last July who said, "I don't know, I never made one." A man who never made a post-mortem on animals, especially on cows, in actual practice has got something to learn. They don't know anything about poultry either, and the poultry industry is going to be something enormous.

In another case I found a young man who didn't know anything about horses, and I had to take him out and teach him how to harness a horse and hitch a horse, because he was afraid. But that man was not ashamed to own up that he didn't know, and is practising today. There are three or four in my section of the state that don't know how to pick up a horse's foot. One day one went into a blacksmith's shop and hired somebody to pick up the foot.

Dr. Maloney: It does not seem to me that the question of ability to harness a horse or drive a horse, or which side of the horse to go in on, has anything at all to do with the function of the examining boards to determine whether that man knows veterinary science or veterinary practice. I cannot conceive of a man being expected to come out of a veterinary college, or a college of pharmacy and immediately take his place among his confrères as a preëminent practitioner. In those colleges he has had the fundamentals of his profession, and it is up to the individual whether he is to be fitted to take his place on a level with his confrères or not, and it seems to me the function of the examining boards is to determine whether that man has received that fundamental knowledge necessary to go on and begin the practice of veterinary medicine. It seems to me that this discussion, so far, has gotten away from the subject of examining men as to their knowledge, but it has got around to examining men as to their experience. There are men who know surgery, who still will never become great surgeons; they have not that faculty; they have not that art that will make them great surgeons, but they know surgery. Our schools should teach the men the causes of disease, to know the disease when they see it, the cause and the prevention of disease, and the remedies. What we are expected to do as examiners is to determine whether the man is clean and whether he is a safe man, and whether he has the amount of knowledge necessary on the diseases that affect domestic animals, and whether he is a safe man to turn loose in the community. It is distinctly up to the college whether they give the man that training or not. If they have given him the training, he comes out and has no difficulty in passing the examination. I cannot conceive of any man passing through any veterinary college that don't know how to pick up a horse's foot. If he doesn't, then it is the fault of the college who is turning that man out. I cannot conceive of a person in college who has never seen a post-mortem examination, if he has ever seen a dissecting-room. There is something wrong with the methods of teaching, and when that man comes out and goes before the examining boards the question whether he knows how to pick up a horse's foot or not will not be pertinent. I do not conceive that we are manufacturing assistants to men who are successful practitioners. The question is, has the student received the fundamental knowledge of veterinary science sufficient to make him a safe man to go out and begin his own practice.

Dr. Ridge: I want to voice Dr. Maloney's ideas. We are not an insurance company to insure men's success in life. For my part I think the present examination, as we conduct it, is nearly right.

Dr. Hoskins: Mr. Chairman, we must not at the same time lose sight of the fact that hundreds of positions are passing out of our control and being filled by other than veterinarians; hundreds of milk inspectors now are employed in which the percentage of veterinarians probably won't reach five. Those are all positions for men acquainted with animal life, and acquainted with life on the farm, and that have had preliminary study and that preliminary acquaintance with animal life that all should have who enter the field of comparative medicine. Then the positions would not be slipping into the hands of medical men in preference to veterinarians, because the man who is going to deal with these milk farms and animal farms must have knowledge of all the sciences that go to make up comparative medicine. I do think it is mighty essential. In two of the prominent schools in our country the student body is made up almost exclusively of men who are holding clerkships in department stores, whose course of study begins at four o'clock in the afternoon and ends at nine o'clock at night. They pursue other employment. I think there is a great need for this knowledge on the part of the veterinarian to be made part of his course.

I quite agree with the speaker that I don't see how the state boards can do differently. A state board may have fifty or sixty men at the same time to examine, and where they have, as in Pennsylvania, eleven branches to examine upon, it takes two days to examine the eleven branches, without any practical examination, nor any attempt to get any practical examination. We ought to have more time in examining men, because the men on the board are the ones who are responsible to the state for the kind of men, and their education and their equipment, that are going out into practice. It is true we do not guarantee it, but what the state put us there for is to guarantee some standard of the men who are going to take upon themselves these responsibilities and are going to ask positions at the hand of the people.

Dr. Stewart: Gentlemen, I cannot resist the temptation to inquire if it is not the function of the examining boards to see that the applicant knows how to give a tuberculin test, and how he is going to do it, and whether he knows how he is going to insert that tuberculin into the animal, where it should be done, and whether he has got it in right, or whether he has put his needle through into the diaphragm, and something about the theory? They ought to know when he examines an animal that is supposed to be diseased, whether he has an actual knowledge of how to carry out the examination. They ought to be able to know whether a man can look into a horse's eye and determine whether it is practically normal or not, or whether the visible mucous membranes are normal or not. It seems to me if the state examining boards cannot afford to take more than two days and they cannot do it in two days, then take five days but find out. They are preparing to determine whether the men are safe, and I cannot see the necessity of not finding the time necessary to give a day or two days. Personally I am a believer in practical examinations, nevertheless I am connected with an institution that permits men to go out that do not always have that kind of knowledge. I want something decided that is going to make us see to it that men have such knowledge. When the state boards will stand up and say, "Gentlemen, you must show us that you have given your students such knowledge," then the colleges will see that the student has that kind and amount of knowledge and training before the diploma is conferred.

Dr. Buckingham: Speaking for the board of examiners of the District of Columbia, I have been present at all the meetings of that board, and a practical examination is required. The applicants are examined for skill in the handling of the horse, and they examine for lameness, soundness, etc. We have, however, allowed that examination to lapse in the last year because it was rather inconvenient. We held our examination in the Municipal Building in Washington, on the top floor, and it was troublesome to go down back of the livery stable and pass out two or three dollars in tips for the men to furnish us with horses for an examination. I am in entire sympathy with several of the speakers here who insist that examining boards shall say what the young man should know. It is always a gratification for me to go into the George Washington University. There we have a man who has been on a farm, and more or less of a horseman, who takes care of that kind of cases; if a young man comes, we make it a particular point, if said man has not had a thorough training with animals, that he shall be made a special subject of interest to the different persons in the clinics. Besides this man takes these boys in hand and teaches them horsemanship and how to hitch and unhitch a horse outside of the general clinic, and the methods in handling. I have been thinking since yesterday that if we had something to go by, especially if the new boards had something that they could go by, something like Cushing's *Manual*, a suggestion along proper lines from the older experienced men in other examinations, what a very useful thing it would be.

The gentleman from Massachusetts yesterday made a remark that he was afraid that if the board's questions were printed they would get into promiscuous circulation, and it would be easy for anybody and everybody to pass. Now I doubt very much whether that would be true or not, because, after he made that remark, Dr. Farrington advised me that of the sixty-four men who applied for civil service examinations there were only twenty-two passed. There is a book published of all the questions in those examinations, and those very boys, the whole sixty-four of them, were graduates of recognized veterinary schools, and yet a lot of them had these questions to look up and only twenty-two got through.

Now I want to answer Dr. Hoskins. The doctor should be very well aware of the fact that the George Washington University compels forty half days or twenty full days from every man who has applied to study veterinary medicine, from the hours of 4 to 10 p.m., to test with tuberculin. It is compulsory and followed up to the hour, because we are better fitted in some respects than almost any other school in the country to give our men actual work in tuberculin testing. On our faculty, as is well known, Dr. Turner has charge of the Soldiers' Home herd, and the herd for the Asylum for the Insane, both of them government institutions. One is a pure-bred Holstein herd and the other is a mixed herd, and altogether there are over three hundred head of animals in those two herds, and they are both tested yearly. The students of our school are compelled to take part in those tuberculin tests. So at least, speaking for one school in Washington, I am sure that it is successful, and that our men are entirely familiar with dairy inspection and with tuberculin tests.

Dr. Maloney: I would like to put a question to the chairman. If it is a fact that men go out of these colleges with this imperfect knowledge, how do they get by the college faculty examinations?

Dr. Stewart: Perhaps it would be fair here to make a statement. Examining boards do not always take into account the relations in this question of examination, and also in the method of examination by colleges. Under the present system of instruction in most of the colleges, the course is graded, and when a man studies a given subject a required length of time, and submits himself to examination and succeeds in satisfying the examiner that he is entitled to pass that examination, he is never again required to pass that subject. And as he passes along, later on, he ultimately passes all the required examinations; but not all at one time but successively. While, on the other hand, a state board examination applies its tests to all or any of the subjects it sees fit at one time, and the student is usually at a disadvantage. Whether the college has done its duty to the young man, allowing him to leave its halls having passed all subjects one at a time or not, is a question yet to be determined by the colleges and by the boards. If the boards will make their examinations comprehensive, as has been suggested, and possibly practical, the colleges will find a way to meet the conditions, and find a way to require their men to meet the requirements of the board. The government has fixed a standard and the colleges have agreed upon a curriculum to meet that standard and they are endeavoring in other ways to meet the requirements. If the state boards can fix a method of standardization, just as has been done by the Government, and they do it, the colleges will comply with that standard.

Dr. Hoskins: I would like to ask one question on this subject. Take a school where there has been as high as 400 or 500 students attending the school, all receiving the same instruction, no personal instruction at all, how would it be possible in the ordinary period of time with the ordinary three years' course of six months to take those 400 men and give them any oral instruction. I remember one time when Andrew Smith was taken to task on the floor of the American Veterinary Association when he was quoted as having said that he would rather have a blacksmith or a horseshoer come to the Ontario Veterinary College and take up the course, than he would to have one who came from college with a college degree. Andrew Smith was right at that time, because if the man had such training and got all he could get from the college, besides was familiar with animal life and acquainted with animals and had handled them, and came from a farm and was acquainted with animal husbandry, that man was sure to go out and make good. Up to a certain point men from the Ontario College did have it, for the great body of the students came from the country. Quite possibly, to a large degree, it was because those men that entered that college were fitted unusually well with the course as laid down at that time.

Dr. Maloney: I don't think, Mr. Chairman, that the speaker has answered my question at all. I think if you will take up a prospectus, you will find they have every facility for providing young men with an education. They show you practical advantages in laboratory courses, they tell you all these things, and yet the chairman of this meeting says that he does not know whether those men have received the instruction that they agreed to give him. They have the practical material at the college with which that man should be familiar, and with which they familiarize him, yet he stands up and says that he cannot give the student a practical examination, and that you men in the big cities ought to give the student a practical examination, that you must provide for all such things, and until you give the college points, he don't know whether the student could pass your boards or not.

Now it seems to me if the colleges don't know whether they are putting out men qualified or not, that the state examination board must determine the amount of knowledge any college has given the applicant to practice. The written examination or any examination that they may determine upon has just one purpose in view, to determine whether that man has competent and sufficient knowledge to be turned loose upon the public, which the colleges say they don't know whether their students have got under them or not.

Dr. Murphey: There have been a number of things that interested me very much, but we have been sidetracked. We were wrong in not getting back to the view-point of this paper, "Making State Board Examinations to Be both Practical and Fully Representative of Modern Medicine." The ideas advanced in that paper have been pretty well supported. We have both a practical and a theoretical medicine. A good many years ago in veterinary training considerable attention was paid to a course called histopathology, and some institutions guaranteed such a course, but the modern drift of medicine, it seems to me, has changed the course very much from histopathology to that of animal husbandry. It is quite possible a man can be an excellent veterinarian and go into special work, and yet go in on the wrong side of a horse. I heard of a young man, who had had considerable practical experience, ask what bran was. He had experience in a country where bran was practically unknown, so he had a right to say that was not a practical thing where he came from.

Furthermore, having a total year devoted to animal husbandry and knowing whether men can put a halter on a horse and back him out of a stall, seems to me absolutely wrong. There is no school under heaven which can do all these things. The whole proposition hinges on what we are going to call practical. A thing that is scientific is going to be practical, it seems to me in the schools where reasonable attention is paid (for example, in the case mentioned by the chairman), to having men in anatomy examine horses regularly. I began that when I started teaching anatomy to my students and they learned to point out the prominences on bones, and if the examiner will find one of the students of two years under that course of anatomy I give a guarantee said student will not be afraid to put his hand on the horse, because he has probably had his hand on a horse at least one thousand times in examining superficial structures. It seems to me that a state board of examiners has a right to ask that practical work be given in colleges, and probably when this committee reports next year they will recommend a method of getting practical knowledge and that then the examining boards may ask whether a man knows how to make a tuberculin test, where he is going to insert the needle, and how he is going to insert the needle, and when he is going to take his temperatures and how.

Dr. Stewart: Do you want to close the discussion?

Dr. Archibald: There is one very essential point to my mind, and that is, the number in our colleges for the best instruction is too large. The student body is too unwieldy. In giving examinations and asking questions along certain lines, for instance along biological lines, we find that the new graduate has a vague idea about immunity, biology and kindred subjects, but when you come to ask him or pin him down to specific knowledge, he hasn't got it, and I think the trouble is that the number in the colleges is too large. When you come to give a student body of, say, 100 students a laboratory course, it is very doubtful in my mind whether you can give them the knowledge thoroughly. I am giving a laboratory course, and I find that when we come to handle over 30 or 40 men, and give them the prescribed course, you have got more than your hands full; that is, when giving them a course which covers a period of three years of six or nine months. I was responsible for the suggestion that was made by the Committee on Intelligence and Education that the college course should be extended and made a four-year course, instead of a three-year course, and more time to be devoted to laboratory and other lines of training. A three-year course is not sufficient to do all that is promised. I think that the veterinary college faculties' intentions are good to carry out the promises or the statement made in their catalogue, but the trouble is they have not time to do it.

Dr. Stewart: The next paper on this program is entitled, "Uniform Standard and Uniform Publicity in Connection with State Board Examinations," by J. I. Gibson, of Iowa.

UNIFORM STANDARD AND UNIFORM PUBLICITY IN CONNECTION WITH STATE BOARD EXAMINATIONS

By J. I. Gibson
Des Moines, Iowa

Mr. President and Gentlemen: I think it is one of the absurdities, probably the absurdity of this convention, to assign such a subject to me. I have only had two years' experience on an examining board, and, so far as I can gather, the faculties have absolutely failed themselves to work out any plan that will bring about the things suggested in my topic. I am a great believer in standardization and standardizing things as much as possible. We have one thing standardized, let me say, as we have adopted one degree in this country. It seems to me the next step would be to standardize the course at the end of which that degree shall be conferred. I presume there are no two lecturers in all the schools of this country, who agree. We will take the anatomist, and I do not suppose any of them agree, and so on through all the subjects. Now you cannot get a standardized product with those conditions. We always hear, and have heard for years, people advocating that we extend the courses. I think it is quite possible to extend the courses beyond any reason. I am told in Germany, for instance, where the courses are the longest, that there is furnished the best field for the midwife and the veterinary quack, because, after you carry a fellow, if he is a nice fellow, from seven to nine years in that professional way and in that professional course of study, you have got him too fine-haired to make a good veterinarian, what you call a veterinary practitioner. I will not object to a four-years' course, and I believe every school should give that. But it is of greater importance to take in the right kind of material than to add even the fourth year. I don't believe there is a school in our country that lives up to its announcement regarding matriculation. There is a man there who nodded and I am in doubt about that gentleman. Now let us deal with that first. If the schools are going to matriculate men that are not qualified according to their announcements, then they should provide a course of elementary studies that possibly could be worked in during his regular course and give the student what you believe he ought to have when you make your statement. I don't believe you can send practitioners to our boards and have them pass our examinations upon subjects that they haven't touched for, say, two years. I never was bright enough and never had a good enough memory to set aside, say, anatomy for two years, and then go up against a good examination and not be liable to fall down. I think in a four-year course the last vacation period, which would be say four months (that is, by the junior student approaching the senior class) should be spent in the field of practice and under the best preceptors that could be selected. For his final year in school, a large portion of that year should be one eternal grinding review. You take a student and say you will finish him in anatomy in the second year. He graduates two years later, and during those succeeding two years you have been pounding a lot of other stuff into him, and it is just natural that you have covered up a lot of the original material that you deposited there and have relegated it to the background. That is why, it seems to me, that the finishing of the graduate, or the candidate for graduation, should be one review of everything you have ever undertaken to teach him.

Speaking about this discussion we have just had as to whether a veterinarian should be able to harness a horse or not, I have been painting pictures and thinking of the automobiles. We will admit that the time may come when the veterinarian will be called by telephone to the farm to treat a horse. He comes to the farm where there are one, two or three autos stalled and he wants to get home. His own auto is out of commission. The farmer says, "I will take you home in one of my cars." Suppose he enters the car and finds that his auto is out of commission, then unless that farmer has a hired man that got the right start in life, one good practical American citizen, they won't be able to hitch up the old team to take the doctor back to town, and you won't be able to get home again. A man, to be a successful veterinarian, should thoroughly understand the life and habits of all domestic animals, besides he should have some love and consideration for them aside from his yearning desire to get the fee. If he has not got a love for the domestic animal stronger and greater than his desire for the fee, he is not, in my judgment, worthy of the name of a veterinarian. (Applause.) The modern veterinarian, with all the modern training, has his eye everlastingly on that fee. When I went through the old school, the old-time short-term school, the fee was seldom mentioned to the student. It was the honorable way in which you should treat your clients and treat your patients. We were to be men of honor and honest in our practice, and get the fee afterward if the man could pay it. In those days there were a great many that could not pay it. I have made many a trip to a farm where the farm was worth from $100,000 to $200,000 and I never got paid for it. Today I could not pretend to draw the money out of clients that I see young men recently graduated pulling from them. I have to fight in my state with men, with veterinarians, who will charge $20 for testing one cow, one sacred family cow, and I never had the nerve to do a thing like that. I was taught that it would be entirely wrong.

The methods of examining graduates should be improved; and I hope that I have made this one thing plain toward the final standardizing of veterinary science and examination, that it is high time for all schools to quit taking in men that they know are not mentally prepared to begin the course. It is time they should quit sending out men that they ought to know are going out to learn 50 per cent. of the business of the veterinarian at the expense of the client.

In our examinations we have not thought an oral examination of any value. Personally I never thought they were of much value. There was a time when the material was poor, the applicants had very little education, some of them were very poor writers, and there was a sentiment cultivated that if you questioned Jones in writing, he would not make a good showing in a written examination, but if you would give him a chance in an oral examination, he would show you that he knows his business pretty well. My experience as an examiner is that he who writes good, writes well on a very few subjects. But if you get a man that is possessed of great knowledge and he can write so you can read it fairly well, he is the best of all. So we give a written examination only upon nine subjects. I think every state board in this country, in the United States at least, should examine upon the same number of subjects, and I think if there is any way to work it out that the same questions should be used in every state of the Union. We have too many kinds of veterinarians. Suppose we have veterinarians in Iowa who are all right. If they have passed all examinations, and are right in every way, that ought to recommend them, and they ought to stand as veterinarians anywhere in the United States. There ought to be standard examinations as nearly identical in every state in the Union as possible, all questions exactly the same, and if possible given upon the same day, so that when the board of examiners in Vermont reports to the world that they have examined so many, who have passed a satisfactory examination, and found them competent, etc., that should mean they are all right in my state or in any other gentleman's state that is here represented, from Maine to California.

Every examination law, I think, makes some reference to a reciprocal certificate, and some of those that I have noticed (I haven't studied all of the state laws), place the reciprocity fee at fifty dollars. That is another graft, pure and simple. If we are going to have reciprocity between states, and a gentleman wishes to move from New York to Iowa, a man of good standing in New York, he should either be given his reciprocity certificate or be charged for what the parchment that it is written on is worth and the clerical service required to make it out, but there should be no high reciprocal fee between states.

I feel like so many members of the faculties do. If you will get together and standardize the course, I will speak for the examining board, and say we will get together and standardize the examinations. And we will pass applicants upon what is decided to be the standard course. While we are now conferring all over this country one degree, Doctor of Veterinary Medicine, we should have the same course, and make that thorough, no matter what state it is in. If you want to make an expert or a head of some great laboratory, we have our schools of research and advanced learning for that purpose, but we ought at least to start by standardizing the veterinarian.

I feel like apologizing to you people for not having a paper, but I have been sick on the days I had set apart to try and write a paper, hence these rambling thoughts.

Dr. Stewart: The program provides that Dr. Loveland should open this discussion. Is Dr. Loveland here? Is any other member of the Connecticut board here who will open this discussion?

Dr. Bland: Dr. Loveland is not here, but I had expected him to be here to open this discussion. I don't know that I am prepared to say very much in relation to this subject. We have our examining board in Connecticut, of which each member is appointed by the Governor. The Connecticut Veterinary Medical Association is ignored in the matter. If we propose any one's name, any man's name that we consider would be a good man for that board, it is given little or no consideration. The Governor appoints whom he pleases.

Our method of examination now is that we have six subjects: anatomy, physiology, obstetrics, therapeutics, pathology, theory and practice. I might say, first, that we give six questions on each subject, and ask the applicant to answer five, and 70 per cent. is what is required in the answers.

There are five members of the board. One of the members takes two subjects and the other four members take one subject each. In the examination of these papers each member examines the paper on his own subject. The full board does not examine all the papers. There has been a question as to the advisability of changing it in such a way that all the members shall see all the papers to pass on them, but we have not got to that yet, and we really have not come to any conclusion as to the advisability of any change. One member wishes it but the others do not.

There is one thing about our examination in Connecticut, and that is, we only have one day of about ten hours to answer the questions, and I really believe, in discussing it with other members, that the time is too short. We have some very excellent and classical men on the board. I am satisfied that some of the questions asked are very difficult, and the applicants should have more time to answer them. But we do our utmost to be fair with all the applicants, and for my part I am ready and willing to send my questions and my percentages and markings to any of the examining boards in the United States. My subject is theory and practice, and I never ask a question that I am not well able to answer myself. I write a question without looking at my text-book, and I write questions that pertain to diseases of common occurrence, and find a great many who answer them very intelligently. Of course once in a while we have one who falls down.

Now I don't know that I can say anything further. At the same time I do believe this (and I am speaking of our own examining board), that another day or another half day should be given to the applicant to answer these questions, and the remaining half day should be given to an examination of the papers by the full board. I think it would be fairer to the student or to the applicant. There would be five opinions instead of one, and I believe it would be the better procedure, and have advocated it and shall continue to do so. I thank you, gentlemen.

Dr. Hoskins: Mr. Chairman, I think we have seen some difficulty in the attempt to standardize the board. I have kept in very close touch with every law that has been passed in the United States. There is hardly any two of them which are alike. There are some five or six state laws where the number of subjects on which examinations are to be conducted do not exceed six. There are some ten or twelve laws where the subjects number ten or eleven. There are a number of other states, or laws of other states, where they have made a further subdivision, making the number of subjects twelve or thirteen, and in a number of those the reciprocal clause is stated in the law, and yet I have known board after board to state that with an examination that is standardized the requirements were not as high—for instance in Pennsylvania as they are in New Jersey, because New Jersey has got one further subdivision of the branches of veterinary medicine. We have had Ohio with her reciprocal clause, and we have had her attorney-general who decided that such was unconstitutional, as Ohio could not recognize licenses in Pennsylvania, although they conceded that our standard was quite as high if not higher than what they were enforcing. But I still feel that after we have threshed out all of these plans of standardizing state boards or attempting to standardize the private schools, or those that are state schools, supported by the state, we will ultimately arrive at the only possible solution.

I spoke yesterday about a federal license. A federal license is the only solution. That license, as I said yesterday, would be accepted by state boards by incorporating it in their cardinal act, not subject to the whims of the new boards or putting in a standard established by one board.

We have in this very year one of the most remarkable situations in the Middle States, where some eight men have passed one of the highest state boards that we have had for a long number of years, and in which the standard was high, because I had helped to make it high, and I have known six of those men to go into another state, and six out of that eight fell down. Yet I am at a loss to know whether it is because both boards have changed, whether the board in Pennsylvania has gone down and the one in New Jersey has gone up or not; but that is the situation, and we will continue to overlap. There is no way of getting away from it under our form of government.

On the other hand there is no way of establishing, as some have suggested to me, as in Great Britain for instance, one common degree of M.R.C.V.S. That cannot be done, because each state elects to set up its own standard, and each state sets up its methods of selecting the members of the board. Dr. Bland has told you of it in Connecticut. That very condition has prevailed in some ten or twelve states where there was an effort made to insert a provision in the law that the men who were to fill those places on the board should be certified to the Governor by the State Veterinary Medical Association, and it was stricken out, or they would have lost the law, because the Governor wants the privilege of making these appointments, which serve political ends sometimes, and which will never change, to my mind. What you are going to ultimately come to is through either the elimination entirely of private schools, and a common basis for a state school (which I think is quite possible), or the immediate solution by a federal license. It seems to me the day of the private school is gone, where the scope of education must be measured by the amount of fees paid. It will no longer serve the progress of comparative medicine, and so we must look forward to state support of schools, and the best of our private schools today to be linked with some state institutions where a possible standardizing of the college course may be possible.

Dr. Bland: I would like to say one of the greatest difficulties we have in examining papers of the applicants for license is the poor writing. We are unable to read what they write, and in fact it seems as if they stuck their fingers in a bottle of ink and simply placed it on the paper and let us guess the rest. If our colleges would only help us out on that score, and only let young men enter their college who can write legibly so it can be read, then they will grant to our examining boards a very great favor.

Dr. Jensen: Mr. President, I have been a member of the examining board for several years in a state that has been very much maligned this afternoon, and I am ready to take up that end of it. I jotted down a few thoughts as expressed by Dr. Gibson, and first of all about instruction. They may not in some departments get that instruction, but in the main they do, and the examinations are nothing but what the average young man ought to pass; nevertheless the dissatisfaction is there, it always has existed and will exist.

Dr. Gibson says the last year should be one complete review. That would be very nice indeed, a very good plan, but should it cover all the subjects? In one school they are obliged to take a short course in botany, and it is very essential that a man should have a knowledge of botany, but what are we going to do? A complete review would be very good indeed. It is so in medicine and I know it is so in anatomy, but in this short course that we are obliged to give in botany, I could not see any practical good.

In reference to oral examinations that the doctor spoke of, I had that problem before me when I was a member of the Nebraska board. A young man told me, "I am compelled to state I cannot write an examination, but give me an oral examination and I will get along first rate." So in order to pass I gave him an oral examination, but we had a stenographer there to take the questions and take down the gentleman's answers. So far as that examination was concered, it depended on the individual, and I believe that a board at least should be prepared to state what they want, whether a written or an oral examination.

Without being at all personal to you gentlemen, members of state boards, and inasmuch as I have been on the state board myself, and was appointed in like manner with you and through political influence, I say this to you, that you know the man appointed politically is not always the man that he should be. For instance, recently in the state of Nebraska there was a young man appointed, not out of school a year, to take care of the live-stock diseases in the great state of Nebraska. They had an old gentleman there before, who was turned out because of politics. It applies to state boards also. You know many times they get men on the state board who are not at all qualified to fill the position, but I trust you gentlemen will not take that as a personal matter for I have served on the state board myself.

If you mean to keep up the relationship that should exist between the boards and the faculties, it can never be established until we have attempted the methods suggested by Dr. Hoskins, namely, a federal license, because then the examinations all over the country will be the same.

So far as the course of instruction is concerned, I don't know that they differ very materially. I had an experience when on the board: A graduate of one of the great institutions of the East came in. He came in a little late and asked for an oral examination. Two other gentlemen on the board said he could have it. I said no, I would not give it because I don't like to do it. He insisted, and so I gave him a mid-term freshman examination, and that gentleman from Harvard University, could not pass that mid-term freshman examination. Now if a state school is so far superior to the ordinary private school, then why such a complete failure as that? That is not the only instance, that is only one of many. We have examined men from state schools and men from private schools, and I tell you you find some mighty poor ones on both sides of the fence. It is simply proof, as it is often stated, of the truth of these arguments.

Dr. Babson: May I inquire from the doctor whether you are speaking of the Harvard University Veterinary School?

Dr. Jensen: Yes, sir.

Dr. Babson: Did you take any pains to find out whether he was a graduate recently?

Dr. Jensen: I know he was.

Dr. Babson: How old was he?

Dr. Jensen: He is older than I.

Dr. Babson: I made the inquiry because I thought he must be an oldtimer, since the Harvard School was discontinued some years ago.

Dr. Jensen: Yes, he was an oldtimer. He traveled with the circus for a great many years.

Dr. Babson: I don't think any member of the examining board expects a graduate of a number of years to be able to pass a strictly technical examination.

Dr. Jensen: That point is very well taken, but you cannot be very technical with a mid-term freshman examination, because it is usually upon preliminary subjects.

Dr. Babson: What, for instance?

Dr. Jensen: In materia medica. If I should ask you what is the common action of one of the most commonly used drugs, and you could not give me the chief actions of it and perhaps some of its physical properties, you would think you were in a pretty bad fix, wouldn't you? I said "I could not do anything for him." The matter got into politics, the Governor was called in, and when the Governor heard my side of it, he said, "Nothing doing."

President Stewart: Any further discussion on this paper?

Dr. Babson: I know we have been asked to confine our remarks to the paper under discussion, but because these papers dovetail one into the other, it seems almost impossible to keep our remarks confined to one paper. Yesterday the discussion ran a whole lot on standardizing the state boards. It almost seems as if state boards were attacked. It was stated yesterday that the matter should be taken up, and something also was said about standardizing the veterinary schools. It was also stated that the Bureau of Animal Industry had standardized the schools and it was not necessary to go along that line any further. But what has been read today is remarkable to my mind on the practical side. I fail to see how any veterinarian can practice veterinary medicine or how he can gain any scientific knowledge in any school if he himself has not been taught and has been unable to gather data to make a diagnosis at the clinical bedside. Therefore it seems as if some schools, either are not living up to the standardization of the Bureau of Animal Industry or the standardization of the Bureau of Animal Industry is a failure. It seems to me that this matter should be gone over together, because it comes before the state boards, the state boards cannot do good work until the schools do good work. I believe our method in Massachusetts of making public the results of the examination year after year, giving the number of men from each school, and the number passed as the result of the examinations, whether it be the first, second or third examination, or whether they were finally rejected, is right. I believe if all state boards published the results it would help them out. It would then become public property, known to the boys about to enter school, and they could for themselves find out which schools were giving the most necessary information, both practical and scientific, and it would then almost compel some private institutions to meet that of the public institutions or be driven from work.

Dr. Sallade: I have had the pleasure of serving on a state board for the last eighteen years, and have listened with mingled feelings of surprise about the discussions going on in these various papers. I wish to say, in the first place, that I do not believe politics cuts quite such a figure in our state, a state that is noted for its political gangs, the same as Massachusetts and all the other states are. I have been appointed and reappointed for the last eighteen years by five different governors of an opposite political persuasion.

Now I rise to present a motion. These discussions are going on from day to day, and cover about the same ground, and I have not been able to see that we have arrived at anything definite, or that we are likely to arrive at anything definite, and I therefore move, Mr. Chairman, that in the future meetings of the American Veterinary Medical Association one or more conferences of state examining boards be held separately as well as jointly with veterinary faculties as now.

And I further move that a committee of three members of state veterinary examining boards be appointed to arrange for such a meeting of members of state boards in 1914.

Dr. Ridge: I second the motion.

President Stewart: The mover and seconder of this motion may not be aware that a motion was already passed yesterday, I think, looking to a conference of examining boards for next year, and to prepare an outline with relation to unifying their work. This would in a measure conflict with that motion.

Dr. Sallade: I did not so understand the motion. I thought that the object of that motion was of quite a different character, that it included the faculties as well as the state examining boards.

Dr. Stewart: It was not so understood by me.

Dr. Sallade: My intention now is that something definite and something perhaps of value could be accomplished if these various boards had a conference between themselves and threshed out some questions among themselves and came back the better prepared to meet the faculties upon these various subjects.

Dr. Stewart: Before taking up the debate any further, let me explain my understanding of the situation: A provision was made for a committee of five to look into the unification of state examining boards, and as to the publicity of their work; also that the committee was to be made up of members of examining boards, and be practically an examining board committee, and in relation to this I will state that the veterinary faculties held a session of their own, independent of this meeting, in January. They feel that we have practically reached the end of our rope in trying to determine the fitness of men to enter into practice, and that the final test of this fitness rests with the examining boards. The faculties are unanimous that the examining boards shall get somewhere and that was the purpose of the motion.

Dr. Sallade: That is the exact purpose of the motion I made, to get the boards together, and I surmised all through this discussion that the faculties had about reached the end of their rope and that they were looking to the boards for some suggestions or help.

Dr. Stewart: I will say that I have selected the committee and I am ready to announce it at any time.

Dr. Ridge: Is that committee composed of members of the state boards?

Dr. Stewart: Yes.

Dr. Ridge: Then I withdraw the seconding motion I made. I withdraw my second of Dr. Sallade's motion.

President Stewart: Dr. Murphey submitted a modification of this motion to cover just these points exactly. The committee was to be composed of members of the state boards.

Dr. Maloney: It seemed to me that motion was misunderstood by many of the men here, because at the time the motion was being threshed out I overheard a member ask the question, How many of the members of the faculty was to constitute the board and how many members of the examining boards?

Dr. Sallade: I thought it was mentioned.

Dr. Stewart: They accepted the modification and the modification was accepted by Dr. Helmer as read in the motion.

Dr. Maloney: I personally accept your interpretation that the committee was to be composed of the examining boards. If that is so, I think it covers this question very well.

Dr. Ridge: I think it would require a majority to do that.

Dr. Maloney: I think it ought to be satisfactory. If you will permit me, I think it might assist us if all examining boards now represented here might call ourselves together, before this session is over and determine for ourselves as an examining body, and that even some suggestions for the committee be made.

Dr. Ridge: I withdraw my seconding of this motion. The president has the committee selected and says he is ready to report it, and it would be a little premature for us to make the motion at this time. If the committee reported by the president is not acceptable to the examining boards, then we could put another motion.

Dr. Helmer: As I understand the suggestions made by the president in his paper, they did not cover the motion. If the suggestions made are not practical, then we can make changes. It remains for this body to thresh out what they consider practical or impractical. It seems to me the only way to do is to ask the stenographer to go back in his work and find what the actual motion was, especially with regard to the appointment of five members from the state boards.

Dr. Stewart: Dr. Maloney understands it as I did, and I think Dr. Murphey waived the nominating of individuals, and accepted the statement as suggested in the recommendation which was read to this body.

Dr. Maloney: Won't it, as our brother has stated. settle the whole proposition if the committee selected by the chair is entirely composed of men from the examining boards?

Dr. Stewart: Yes, and I should be pleased to report the committee now.

Dr. O. L. Boor, Indiana; J. T. Seeley, Seattle; E. W. Babson, Massachusetts; Thomas J. Downing, Iowa; Moses Jacob, Tennessee.

Those are members of boards representing different areas of our country.

Apropos of this, I will say that a number of members of boards on the Pacific slope and contiguous territory have already resolved to have a meeting here some time this afternoon with the view of arranging for reciprocity. I feel sure that they will be glad to meet tomorrow with you men who are members in the eastern and central part of the United States if we could fix a time. I think we can meet, and then the committee could get from these boards some suggestions looking to a friendly investigation of the work to be reported back to this Association.

As to the relation of the colleges, the college men themselves have not tried to push in on this particular program. They have entered very sparingly into the discussion, and only when they thought they might elucidate a point or two. I believe I am voicing the sentiments of colleges clearly when I say that they feel that the examining boards are the men who test the product of their work, and that they would be helped, and would be very glad, indeed, if the testers could establish some sort of a substantially uniform test, not expecting it to be absolutely uniform, but substantially the same everywhere, and it is in my judgment possible for the various examining boards to get into some close harmony along these lines if they will attempt to do so. There will be various opinions, but that will be expected. Nevertheless they can get in pretty close unison as to the line of examination, and particularly do I trust that you will take up the question of publicity and make provision for the publication of the results of the examinations in every state, and if your committee and yourselves shall deem it wise, not only to publish the result of the examinations for a year or two years, but also to publish the list of questions so that men teaching in the schools can know about the scope of the examination that these examiners deem wise to submit to applicants for license, and also that they may be able to say to the students about to graduate, "You cannot pass the examination; you cannot pass the examining boards; there is no examining board that will let you by." It gives moral support to the management of schools and you can appreciate how much that is needed at present. I represent a school which stands particularly high, and which undertakes to honestly carry out the provisions under which it lives, as a teaching institution. I do not want to say anything about any other institution, but I do feel as though some of them perhaps know this fault more than the institution I represent. I am not saying it with any feeling in the matter at all, but you can render education and the cause of education a very great service by establishing a standard by which to measure the results of the teaching in schools.

I think Dr. Maloney is entirely wrong in thinking that the schools must do the standardizing. If he will pass some sort of standard that he thinks the schools should come up to, then if the schools fail, he has a right to criticise them seriously. If they do not have his standard, they have no way of knowing what should be taught necessary to meet and carry out the conditions of Dr. Maloney's view. If we can get the view of all the examining boards of the United States crystallized into some sort of form by which to judge, I believe the colleges will do their very best to bring their work up to the highest point of the standard, and if they cannot do it, they will discontinue their course. This committee is made up of members of examining boards of various sections of our country, and if that don't meet what you wish in this matter, let us hear a motion and I will be glad to entertain that motion if you think it will serve the purpose better.

Dr. Sallade: It was the recommendation of Dr. Murphey then, as I understand it.

Dr. Stewart: He practically withdrew his specifications, and adopted this amendment, and I think Dr. Maloney understood it that way clearly.

Dr. Maloney: I want to say that the chairman's elucidation is perfectly satisfactory to me, and satisfies my understanding of the situation. I think it brings our friend's motion to the same end that he desires.

President Stewart: That is what I supposed.

Dr. Ridge: It does to me.

Dr. Stewart: Is there any further discussion on the paper we have before us?

Dr. Gibson: Yes, my Nebraska friend said that I said there should be nine subjects on the board of examination. I said we examined on nine subjects. I think if the boards are going to do business, we ought to examine on every subject that schools are required to teach; I think that is a fair plan. My two years' experience has led me to believe that the government has either slipped, or has had it slipped over them, by some schools. I think they have passed some schools where they do not belong. Some schools, so far as our knowledge goes, are not trying to turn out good scholars, but they are turning out some awful poor ones. I would like to see the examining boards have their own little conference together, and I believe even this committee that represents the examining boards, and makes a report in 1914, that their proposed report should be carefully gone over by the entire members of examining boards present next year. I think the gentleman's motion is a good motion.

Dr. Stewart: I would be willing to entertain the motion.

Dr. Gibson: If the examining boards could have time to meet during this session it would be a good thing.

Dr. Ridge: I would like to know their findings before it goes in. I would like very much to know what they have worked out before they went into joint session.

Dr. Babson: I would like to say that I would like to see a call for a meeting of the various boards in this room right now. There is a lot that we want to say together.

Dr. Sallade: Dr. Gibson states the object that was uppermost in my mind, and I am not so sure that this committee of five will make a representative board of the examining boards. I am not convinced, I say, that that report will be the sentiment of the boards without it first being submitted to the members.

Dr. Maloney: I rise to interpose a motion on a point of order. A motion made of that character in a joint meeting, having its only purpose for the direction of a special number of a joint meeting, is out of order, and will have to be made at a meeting of the boards of examiners.

President Stewart: I think your point is well taken and it is sustained. However, I will say this, that I will notify personally each member of this board and request this committee that they set a time when they will meet members of the various examining boards before this convention is closed for the purpose of a conference, and I believe that we may meet the purpose you have in mind. Anything further in relation to this particular paper? If there is not, we are ready to proceed with the program. The hour is now half-past four, and Dr. Helmer has a paper which he would like to present, but no doubt he feels as though he would like to present that paper when there are more members present.

Dr. Helmer: My object in preparing my paper was to make it possible, in the future, for state boards to hold their first meeting or meetings separately, and then enter a joint conference with the faculties prepared to advance something definite and thus avoid discussions that have not in the past brought our objects to any practical ends. If it please the house I would much prefer reading the paper tomorrow.

Dr. Stewart: I have lived through this for nearly twenty years, and have noted the futility of our discussions. We have had separate meetings of examining boards and separate meetings of the faculties, and we did not get any further, so I do not know but we are reaching a time now when we might, with some degree of satisfaction, get somewhere. Let us have separate meetings, let us try this, and see whether or not we will still deem it necessary to make a separate organization.

Dr. Helmer: We are now more experienced and should attain better results than in the past.

Dr. Stewart: This completes the program of the day. We have a paper by Dr. Spencer on the subject of the problems of examining boards in the South. It would not be of very much interest to you in this discussion unless there was a number of the boards of Southern states represented here to take up its discussion and elucidate the points. Unless you particularly desire it, we will refer that paper to the publication committee and consider our program of the afternoon completed.

PROBLEMS OF EXAMINATION BOARDS IN THE SOUTH

By T. N. Spencer
Concord, N. C.

Mr. President and Gentlemen of the Association: The South is at present just coming out from a long sleep, so to speak, and is rapidly taking its rightful place in the industrial world. Those who are not familiar with the southland cannot realize what hardships were brought to bear on it during the war, nor do they have any idea of the condition of affairs during the reconstruction days.

Until comparatively recently but few trained veterinarians were in the South. In fact, in many localities the livestock was so scarce and of such a character that the revenue from the practice of veterinary medicine was not sufficient to furnish a livelihood for the trained physician; therefore, the practice fell into the hands of empirics and much of it remains in such hands today, but fortunately their days are numbered. A great many localities in the South have never had access to a graduate veterinarian, and a great many people do not know that the practice of veterinary medicine is a science, and that the veterinarian is a real human being with rank just the same as men of other professions.

State examining boards have had a hard road to travel, as most of them have had a great deal of empiricism in their makeup, so much in fact that the graduates were at times in the minority. The board was generally backed by a very weak association, the majority of whom were quacks and low-grade graduates.

The graduates in North Carolina until comparatively recently were in the minority to such an extent that it was almost impossible to get an effective practice act through the legislature, but at present we have a very good law, and the last legislature gave us a penalty clause.

The state examining board is now composed of graduates from recognized colleges, and the state association is controlled by graduates and very few empirics are seen at the meetings and those who do wander into the meetings are not made to feel very much at home.

Veterinary medicine has made more advancement in the last three years in North Carolina than all previous years combined. Graduates are rapidly replacing the empirics and southern farmers are turning their backs on empiricism. The state examination is composed of ten subjects, viz., anatomy, surgery, materia medica, therapeutics, obstetrics, chemistry, practice of medicine, bacteriology, pathology and physiology. The board is appointed by the Governor upon recommendation from the association, and fortunately politics are conspicuous by their absence.

In behalf of the North Carolina Board of Veterinary Medical Examiners I appeal to this organization to take steps toward state reciprocity for the practice of veterinary medicine. It is certainly wrong for a man to be required to take an examination every time he seeks a location in another state. He may be a first-class physician with years of experience, yet may completely fail on a technical examination after being out of college for several years. We can all see wherein lies the benefit of reciprocity and this organization is certainly the one to handle the matter.

The North Carolina Board stands to support any measure that will bring about state reciprocity and will reciprocate with any board giving an equal examination. Again I urge that the matter of reciprocity be thoroughly discussed and some action be taken at this meeting.

DR. STEWART: Do you desire to have anything further this afternoon?

DR. MALONEY: Do I understand the chairman is going to notify the members of the committee?

DR. STEWART: I will notify this committee, and urge them to fix a time for such a meeting before the close of this Convention, perhaps tomorrow some time. I think our program tomorrow will be short enough so they might make the arrangements.

DR. SALLADE: It might be well to do so, as some members may not remain until the end of the week.

DR. HELMER: It might be a good idea to have the meeting held tomorrow after the close of this meeting.

DR. STEWART: That is my suggestion now.

Upon motion duly made and seconded it was voted to adjourn.

WEDNESDAY AFTERNOON, September 3, 1913

THE PRESIDENT: Gentlemen, let us please come to order and hear the first paper on our program. We have two papers the authors of which are here and I feel as though we should hear those papers and then take such other action as shall remain to be taken at this session.

The first paper to be offered is by Dr. Jacob, of Knoxville, Tenn.; subject, "The Teaching of Veterinary Science in the Agricultural Course." I will ask Dr. Jacob to read his paper.

DR. JACOB: Mr. Chairman and gentlemen: Before reading my paper to you, which I want to say to you is a very short one, the benefit to be derived from it will depend largely upon the aftermath, in others words the discussion. I want to say that I heard the report this morning of the committee which was appointed to investigate this subject by the American Veterinary Association, and like some of the other members who went over there this morning I was to a degree considerably disappointed from this standpoint, when they reported that they could offer no feasible standard to control this particular line of work. This I think is a mistake. I believe you can set a standard for any line which is worthy and which does some good.

THE TEACHING OF VETERINARY SCIENCE IN THE AGRICULTURAL COURSE

By M. Jacob
Knoxville, Tennessee

Every veterinarian who has had the experience of teaching veterinary science to the agricultural student has, I presume, on many occasions attempted to satisfy his own mind as to just what should constitute the proper course. If the same as taught in each and every agricultural school in America were investigated, there would be found a marked variation in many respects.

There are three questions which appear most prominently to my mind and have prompted me to write this paper, viz.:

1. What are the purposes to be accomplished?
2. What branches should be included in the course?
3. The necessity of a standard for a more uniform method of teaching.

Furthermore, I feel that the Association of Veterinary Faculties and State Examining Boards of North America is the logical body before which this subject should be discussed.

The true purpose of the course is not infrequently lost sight of and we find every now and then the impression prevailing in a certain student that when he finishes his course he will to a degree be competent to practice. This of course is an injustice, not only to himself, but to the veterinary profession and the general live-stock industry as well. Therefore the conscientious teacher will impress upon the agricultural student this distinct difference between the qualified veterinarian and the graduate in agriculture who has studied veterinary science only as a part of his general curriculum.

The average agricultural student finds a certain fascination in veterinary work and there is often a marked tendency on his part to attempt a little more than is expected of him in its practical application. While we all admire the ambitious student, still we find here the danger of attempting too much. For example, a few weeks ago I received a letter from a former short-course agricultural student who now resides in another state and has charge of a dairy where they are milking 110 to 115 cows. He has held this position for only a few months. He reminded me of the fact that he had been one of my former short-course students, but had neglected taking notes on all my work and asked that I send him full instructions as to the application of the tuberculin test. He stated also that the herd had been tested a year or so previous with the result that several head had reacted. This time he himself wished to test the herd and that was why he wanted the information. A few days later I answered his letter and informed him that I thought he was making a serious mistake in attempting this test himself, explaining my attitude in detail. I further advised that he place this work in the hands of a qualified veterinarian. A few days later, much to my surprise, I received a letter from him stating that he had written to a state veterinary official who had given him full instructions. Here, I believe, is a good example of the point I am attempting to illustrate. I feel that to have encouraged that man to conduct the tuberculin test on that herd of 110 cows would have been unfair, not only to himself and the owner, but to the public as well.

However, there are many good reasons why veterinary science should be included in the modern agricultural course and to find it missing would only be an indication of its weakness. In order to accomplish the most good a thorough coöperation between the chairs of animal husbandry and veterinary science is highly essential, for here we have presented to us one of the real purposes we wish to accomplish, namely, to qualify that student so that he will more fully understand live-stock from its various phases.

Other things being equal, the more thorough the course in veterinary science the stronger the course in animal husbandry, and consequently a more proficient student. If he is so fortunate as to obtain a degree in both veterinary science and agriculture, he has access here to the ideal, for it should qualify him to intelligently handle the live-stock question from practically every angle.

In selecting the branches which are to comprise the veterinary course the things we wish to accomplish must be foremost in our mind. Every subject must have its distinct aim to make that student more proficient in some phase of animal husbandry, but at the same time the true relation toward the veterinary profession should not be overlooked.

I can do no better here than to outline the veterinary science course as taught in the agricultural department of the University of Tennessee, not that it is ideal in its every respect, but it will I believe offer a satisfactory basis for discussion.

We divide the course into a two-year study for juniors and seniors of three hours per week.

During the junior course the following branches are taught: anatomy, physiology, dentition, bacteriology, including stable hygiene, horseshoeing and conformation and soundness.

The senior course includes the study of animal plagues, including parasitic and microörganismal diseases, sanitation in meat and milk production and clinical work.

While it is true that all the branches included in these courses cannot be considered with the same degree of thoroughness and detail as is done in the regular veterinary school, still it is in keeping with the allotment of time and fully answers the purpose to be accomplished. On the other hand, however, there are certain branches which are taught almost as fully as in the veterinary school. I refer here especially to dentition, horseshoeing, conformation and soundness and animal plagues. As to the latter, I think it a matter of great importance that the agricultural student be exceedingly well informed, for the difficulty encountered in combating transmissible diseases on account of an ignorant public is only too well known. As clinical work the student puts in two hours per week in the hospital, his duty being to assist with the regular routine of cases as they appear for treatment. Here the following points are in a practical manner brought to his attention, viz.: animal restraint, bandaging, method of administering medicines, reading of temperatures, pulse, respiration, etc. In plain words he is for the time being a general utility man and if necessary must do anything from washing bottles to an assistant in more scientific work.

There are some I presume who would offer an objection, claiming that as an agricultural student he is getting too much veterinary science, but in that idea I cannot concur, for I consider the properly trained animal husbandry student a wonderful asset to the veterinary profession, both from the standpoint of the private practitioner and the veterinary sanitarian. After all, the impression which is conveyed to that student depends largely upon the teacher himself, and the veterinary profession has nothing to fear, but on the contrary everything to gain at the hands of the properly trained agricultural veterinary student.

The necessity of a more uniform method of teaching veterinary science to the agricultural student is a question of extreme importance. As it is, each and every agricultural school has a method of its own. While I do not at this time wish to submit an absolute opinion as to just what that standard of teaching should include, I do think it high time that some definite steps in this direction be taken. Its relation to the veterinary profession and the live-stock industry is distinct and consequently is entitled to a thoughtful consideration by this body.

THE PRESIDENT: Gentlemen, you have heard this well-prepared paper covering a very interesting subject. I note by the program that Dr. Connaway is listed to open this discussion. Dr. Connaway does not seem to be present, although he expected to be. He was particularly invited to participate in this discussion because he is one of the men who, I believe, has carried the instruction of agricultural students to a high degree from an agricultural viewpoint. Dr. Cary, the second man listed, is not in the room. The discussion is now open to any gentleman who cares to discuss it. This paper offers very valuable suggestions. Examining boards are doubtless being besieged by men, as they are in Missouri, to permit them as agricultural graduates and students in agriculture having taking veterinary instruction to appear before the board for license to practice, and within recent times at least two of them have been permitted licenses to practice in the state of Missouri by the state board.

DR. MURPHEY: I would like to ask the author of the paper the method of teaching some of the subjects mentioned, but not in detail, in the paper. For example, anatomy.

DR. JACOB: The subject of anatomy is taught somewhat superficially, the things impressed upon the students especially being the anatomy of the digestive tract, the anatomy of the reproductive organs, and the structure of the anatomical foot. That is as far as these men have gone. Those things are given very thoroughly. Every now and then we have the opportunity of holding post-mortems, but we do no actual or regular dissections, although I believe that part of it could be strengthened considerably by allowing the students to dissect the limb from the knee and hock down.

DR. MURPHEY: Now on the subject of physiology.

DR. JACOB: The subject of physiology is largely the physiology of digestion and to a degree the physiology of the reproductive organs, especially the mammary glands. You see that the bearing between that work and the work from other sources is to fit him more thoroughly for his live-stock work, which is kept in mind.

DR. MURPHEY: There is no laboratory work?

DR. JACOB: Not in physiology.

DR. MURPHEY: Does he have his work in physiology before or after his work in medicine and feeding and general nutrition?

DR. JACOB: Usually before.

Dr. Murphey: I was interested, Mr. President, because of the fact that we teach some agricultural students, a large number of them. We have a general course of training. We give a general course in anatomy, a didactic course, and illustrate it as far as possible by using various specimens and the horse. The animal husbandry work at Iowa is pretty well divided. The animal husbandry students do some dissecting, but it is intended primarily that the matter of conformation and the digestive tract be thoroughly taught. They get work in physiology and a course called obstetrics. It is simply anatomy and physiology of reproduction. It never gets to be half developed, but it does take up monstrosities.

Then there is the course in horseshoeing, conformation and soundness, and sanitary science, but there is no clinical work of any kind given. The discussion that has come up today is interesting in regard to having a standard course. I believe it would be a very good plan to have it, but I want to be modest about presenting it to the agricultural department, because it is difficult for veterinary faculties associated with agricultural faculties to change the courses. They feel rather sensitive about having anything dictated to them in courses dealing with veterinary science. It is difficult for such instructors to keep pace and not give clinical work. That is where we have had considerable difficulty, but we have stayed the storm so far.

Dr. Burson: Mr. Chairman, during the last three years I have had under my charge the instruction of students in agriculture, and along with Doctors Jacob and Murphey I must say I was considerably disappointed in the report as rendered this morning in regard to the agricultural college instruction. Our work in Georgia is somewhat different from what Dr. Jacob has described as his work in Tennessee. Students come to me in their sophomore year, although they have three years instruction. In addition to these we have a one-year course, a three-months course and a ten-day course.

In these shortest courses we try to give as much condensed information in regard to contagious diseases and the physiology of digestion and milk production and so on as possible. In the regular three years course the students in the sophomore year get a combined course of anatomy and physiology, and in laboratory work make drawings and models of the various parts of the anatomy of the horse, and study under the microscope and make pencil drawings of histological specimens.

The work in anatomy is largely classroom work. I have models and charts, and in addition do some gross dissection and demonstrate wherever possible gross anatomy from the horse and cow.

The junior students get a half year's work; that is, three hours per week, in bacteriology. In addition to that they get instruction in horseshoeing and clinics and some general pathology and a pretty thorough course in parasitology. The last half term of the junior year veterinary practice is taken up; that is, theory and practice and clinics. In the senior year students are required to do some clinical work, administer medicine and make diagnosis of cases. I take particular pains to instruct every student coming under my supervision in the fact that we are not undertaking to make veterinarians or even quacks of them, and I inform them of the various state laws in regard to the practice of veterinary medicine, and I go a little further and tell them if I ascertain the fact that they are trying to practice illegally I would be the first man in the state to undertake their prosecution.

I believe a properly qualified agricultural student goes out to the farmer or as manager of some stock farm or dairy farm, or some place like that, and becomes probably the best qualified veterinarian in that locality. While I would be very glad to see uniformity established, it will, I have no doubt, be a difficult proposition to get the college authorities of the various states to work in unison in this manner.

Dr. Boor: Mr. President, I would like to ask the doctor from Georgia if he at any time has known of any cases in which his students did go out and try to practice or did practice on live-stock other than their own?

Dr. Burson: I haven't had any such cases come to my observation thus far.

Dr. Boor: I will say for his benefit and for the benefit of the other members present that, in Indiana, we have had considerable trouble from students of the experiment station, who only have a smattering knowledge along veterinary lines, attempting to practice and especially in the matter of using serum for the prevention and cure of hog cholera. We have had a lot of trouble along those lines, and sometimes it occurs to me that there is a lot of these fellows and a lot of people who would be better off if they hadn't taken these courses. Now,. mind you, I am not objecting to a man getting an education, but when he gets just enough to make him dangerous, then I do object. And the reason I asked the doctor that question is because we have had that trouble in Indiana.

Dr. Jacob: I might say in that respect, and I thought I made it pretty clear in what I said, that we give no treatment of diseases there whatsoever.

Dr. Boor: I understand that.

Dr. Jacob: Not even the simple things like colic. The work they get in diseases is simply animal plagues, to educate them in that particular line.

Dr. Knowles: With the author I believe that this issue of the course given at the college depends in a large measure upon the individual instructor. In Montana the agricultural students get a veterinary course for two years. They also have short courses. In my practice the best clients I have are the men who attended the agricultural college and have taken the veterinary course. They are intelligent, they know when they have got something which really needs professional attention and they do not abuse it by attempting to treat it themsleves in a way that they are not qualified to do.

Dr. Murphey: Another point occurs to me. It is a fact well known that in some agricultural institutions, where they have veterinarians teaching animal science, they have animal husbandry instructors who give considerable on veterinary medicine. I don't believe such ought to be unloaded on the veterinarians who are teaching in the institution.

I know of some institutions of that kind. In one of them the instructors tell the students how to give serum for hog cholera. They have veterinarians there who will not teach it, but it is given by the animal husbandry men.

The President: This is a subject that I am very glad indeed has been brought before us, particularly in this division, as it was also brought before the general meeting in general session. The state board examiners in many of the states find it a very important and live question, just as I have alluded to in the state of Missouri, where the agricultural students have been trained to think that they were better qualified to suppress hog cholera by the administration of serum and virus than were the veterinarians. Also that they were better prepared to suppress tuberculosis and to recognize it better than the veterinarian. They were rather puffed up from the teaching they got in the agricultural college. I don't know as it came from any one veterinary instructor, as they have two or three veterinarians on the staff teaching there. The situation developed as some speaker declared, in the state of Mississippi and the state of Michigan. The veterinarians there are feeling somewhat aggrieved at the agricultural institutions and the thought inculcated has been such that it gives the impression that the agricultural students are better qualified to undertake the suppression of the diseases mentioned than our veterinarians; also that the privilege of a license to practice should be extended to these men. It is a problem before you, and whatever you can do will testify to the views of the veterinary profession as to the kind of instruction best adapted for the agricultural line, also the lines along which you believe veterinary instruction should be given. I believe that the veterinarians in connection with the agricultural colleges would be largely guided by such influence. They are somewhat at sea without any proper guidance in the matter; they are subject in some measure to a pressure brought from within.

If they say, "Here is a large body of veterinarians expressing their approval along certain lines and it has my approval also," then the president of the college or the dean of the agricultural department will not so persistently demand that the instruction be carried further. They should be in a position to say to the students, "If you want a veterinary training you should go to a veterinary school and get it."

I think the question will be before you for some time and you should give your thought and your voice toward the solution and formation of what you believe a veterinary student should get in a course of agricultural instruction. I can't express it any better, but I believe he wishes it along certain lines of elasticity.

Dr. Baker: Mr. President. If you will allow me, I would like to express a few thoughts upon the subject. Being connected with a veterinary college, the question of granting an allowance to graduates of agricultural colleges to enter an advanced class of the veterinary college crops up every day, and you are all familiar with the fact that the Department of Agriculture, in their Circular 150, allows the veterinary colleges to give graduates of agricultural colleges advanced standing providing the veterinary course that they have received is equivalent to the first year at the veterinary college. Now in many respects an agricultural college graduate has had more of some things than the veterinary college gives, but to offset that they have had too little of some other things. Now what they have had more, and which is greatly to their advantage, are those subjects relating particularly or peculiarly to animal husbandry, such as feeds and feeding, breeds and breeding, stock judging, etc. Those subjects probably—yes, I will admit, positively—we cannot do them justice in the regular veterinary college curriculum, and I do believe that the agricultural college students get those subjects greatly to their advantage if they wish to become veterinarians later. But what we find that the agricultural college graduate is deficient in when it comes to allowing him to enter a class, the second year for instance of a three years' course, is anatomy. Circular 150 requires that we give the students five hundred hours in anatomy. That is two hundred hours in the classroom work and three hundred in the laboratory or dissecting. And how to divide those hours in the veterinary college is a question which we have to consider in order to make it possible to admit agricultural college students to advanced standing. An agricultural college graduate has not had anatomy enough to enter our junior course, because they have not had as much anatomy as we give the first year, so that of all the subjects that we in the veterinary college business and those of you in the agricultural college business are most interested in is anatomy. And I don't believe, gentlemen, if you give your students a little more anatomy that you are going to make quacks of them. I think you can give them more anatomy to advantage.

Then when it comes to the matter of medical therapeutics and pathology, it may be that you are giving them more than you ought to, because, as has been intimated, if you give them a smattering, as a rule, such a man will not assume when he gets through and takes an agricultural college diploma that he knows enough to practice veterinary medicine. I think that the graduates of agricultural colleges are high-class men and when they graduate from an agricultural college they are raised above the inclination to become quacks in any line, veterinary medicine not excepted. Of course there are exceptions, and we have exceptions to all rules. But an education along veterinary lines that the agricultural college student of today gets makes him a broader-minded, better veterinarian than those that enter primarily as freshmen in the veterinary college. There is no doubt in my mind about that at all. I find on general principles that the more a man knows of veterinary medicine, supposing he is in the agricultural line, the better it is for the local veterinary practitioner. The agricultural college graduate knows that he does not know enough to practice, but he does know enough to know when an animal is sick and when it is proper to call a veterinarian.

Here is one of the most important points involved in the situation. It behooves the veterinary colleges to send out their men properly qualified because the agricultural college graduate is going to look on his work, and he can judge of his work whether it is good, bad or indifferent, and he can size that veterinary man up pretty correctly. So instead of fearing the agricultural graduates I think the veterinary profession should esteem them their best friends.

In conclusion, Mr. President, I would like to suggest that the veterinary course in the agricultural college be extended along anatomical lines. Give them a pretty fair course in dissection. Learning the anatomy of a horse, a cow, dog, a sheep or a pig isn't going to make a quack of them. No, sir. I think education elevates a man above the inclination to become a quack.

THE PRESIDENT: Gentlemen, as time is a factor I suspect we have given this a pretty fair discussion and the doctor says he doesn't care to discuss it further. We will go to the next paper, "Report from the State Board of Pennsylvania," by Dr. Helmer.

REPORT OF THE STATE BOARD OF PENNSYLVANIA

By Jacob Helmer
Scranton, Pa.

Mr. President and Members of the Association: The State Board of Veterinary Medical Examiners of Pennsylvania desires at this session to go on record relative to the following particulars:

The members of said board are aware that by unity only will it be possible to reach and to perfect the objects we have in view. We concur that veterinary examining boards should be represented at the annual meetings of this Association, and regret that attendance in the past of representatives of state boards has been rather small.

The board of Pennsylvania extends the hand of good fellowship to all sister state boards, and besides joint meetings, as now, with the veterinary faculties would recommend that one or more exclusive meetings of the representatives of said boards be held at each annual session. We feel that such a course will promote acquaintance and friendship between boards, growth in attendance be stimulated, besides boards as boards could go on record on the problems of higher education.

As long as our profession is in a period of transition from infancy to maturity and prohibitive laws need to be enforced against illegal practitioners, so long at least will the services of state boards be required. But it is also within the power of state boards to exert a wholesome influence on the standard of veterinary education. The highest development of such and other functions of state boards appears to demand separate conferences as well as conferences with the Association of Veterinary Faculties.

Reviewing briefly a few interesting questions that have been discussed in this Association, let us consider first the one on federal license. Is not the question today of a federal license as against a state license merely a sensational rather than a practical question? It has not yet been made clear what is meant by a federal license to practice veterinary medicine in the United States, since veterinary education in this country issues from the states only.

The principal arguments urged in favor of the proposition are that it would give standing to veterinarians in this country and prestige when travelling abroad; that it would confer eligibility to any government veterinary position; that men acting on state boards are apt to be changed from year to year through partisan political influence and thus boards become weakened in mental and moral character, to avoid which we must seek federal relief. The State Board of Pennsylvania regards these propositions as unnecessary, impractical and unjust. Was the step taken for higher veterinary education in the state of New York due to federal influence or was it due to the early influence upon its institutions of educators like Horace Mann? Has the wonderful progress made in veterinary medicine in America been due to federal influence or to the activity and acumen of such men as Alexander Liautard, of New York, and Andrew Smith, of Toronto, these men having given to the profession its earliest impetus? What have all the educated and active veterinarians of this country lost because of not possessing a federal license? Will the future produce greater than have already been produced? Has not our profession by hard work and merit in the past developed strength and moral force enough to care for the generations of veterinarians yet to come? Does the federal government employ veterinarians except in the army, and while on every hand so much progress has been made what has the federal government done for the army veterinarians? Are not other veterinary employees of the government, veterinary sanitarians who need no license in any state or in the government employ to do sanitary work? Could a federal license be issued that would be a passport in foreign countries except from a federal government school in high standing and would anything in lieu thereof not be open to question? Have not all successful men a standing? The rank is but the guinea's stamp. Emerson said if you can mend shoes as good or better than anybody else, even though you live in the woods, people will flock to your door.

Our veterinary educational system today is built on practical and progressive lines, showing each succeeding year a natural and healthful growth for the future. Under this system all the parts of this vast country, with all its varying conditions, are being gradually supplied with competent veterinarians, and for all those who desire to seek such employment as the federal government may have for them to do the opportunity has not been abridged.

Any method or institution employed to examine the product of our schools for a license that would be more severe than state board examinations now are, would cause so large a percentage of failures that the orderly, natural growth of our profession would be checked.

The Pennsylvania board accepts its duty as it sees it, viz., to coöperate with all other boards, with veterinary faculties, legislators, and with all concerned, to perfect present conditions on present lines. Not today but gradually and assiduously through experience the problems of veterinary education will solve themselves.

Relative to the influence of politics on state boards, they are apt to be improved as often as weakened. The boards were created in politics. This country is necessarily one of parties and party politics. Conditions as we find them are natural in a republic like ours. It is, all things considered, the greatest and best country on earth. It is our duty as a profession to proceed constructively, not eschewing politics, but to bend conditions to our purpose. All the good veterinary laws, all the protection received and all the progress we have made have been achieved in politics. In many instances our failures were our own fault, but every year notes a gain. On the whole, legislators are not our enemies but our friends, and we shall receive from a majority of them all we desire and deserve.

Another interesting and important question is that of reciprocity in exchange of veterinary licenses between states.

Owing to the fact that veterinary laws of states, pertaining to standards of examinations and other requirements, are not the same and that some states have no veterinary laws, general reciprocity is as yet impossible. It would appear, however, that a kind of limited reciprocity would at this or at any time be proper and just. The question appears to be wholly in the hands of the state boards. For illustration, assume a college graduate with years of experience, of good moral character and professional ability, who purchases property in another state, intending to make said state his permanent residence, should such a one be denied the privilege of competition for a livelihood in that state? Such an applicant should conform to the law. But in Pennsylvania the law makes it optional with the board whether the examination shall be written or oral or both, thus giving the board the control of all such situations. Even with states whose examinations might be found to be practically on an even basis, would it not for the purpose of protection be wise to require an examination, since it would tend to discourage itineracy? Would it not be better to have no reciprocity with a fair and just examination rather than absolute reciprocity between states on an equal basis? State board conferences would no doubt satisfactorily settle this question.

It is the bounden duty of colleges, veterinary associations, as well as state boards and all concerned, to adequately protect the practitioner. Young men are led to take up the profession for their life work, and the means of being successful should not suffer from innovations from any source whatever inherent in the profession.

It is a matter for congratulation and speaks well for the work of the American Veterinary Medical Association and the veterinary colleges of this country that we find so many able instructors on the teaching staff of all our institutions. The curriculum, grading the work, facilities for proper instruction, discipline, all are infinitely better than twenty-five years ago. The adoption at this time of a higher standard of preliminary education and of a lengthened period of instruction, without lengthening the curriculum, to insure students being more thoroughly taught, is also a self-evident proposition, although three years of eight months each would seem more logical and appear to work less hardship than four years of six months each.

The State Board of Pennsylvania entered our last legislature with three important amendments to our veterinary laws. One amendment classified veterinary dentistry as a part of veterinary medicine and surgery by stating it in the law. Another provided that the power to bring prosecutions be extended to any citizen, approved by the state board, and the third amendment contemplated raising the annual license fee from one dollar, as now, to five dollars. It provided for a sliding scale of from one to five dollars per annum, according to the financial necessities of the board. These amendments passed both house and senate with only four dissenting votes, but unfortunately were vetoed by the Governor on the ground as to taxing the profession, that money for our purposes should be appropriated by the state and be drawn for our uses from the state treasury. After the veto we asked the Governor by letter for an appropriation of four thousand dollars. He favored twenty-five hundred dollars, which appropriation was finally passed by the legislature and approved by the Governor. The object of the board in taxing the profession was to create a sufficient fund with which to prosecute illegal practitioners in our state, especially graduates of veterinary correspondence schools.

Relative to the correspondence school at London, Ontario, Canada, the Pennsylvania board has convicted and deterred from practice a number of its graduates. Our plan is to prosecute and publish all convictions in a general as well as in some local newspapers. We believe that publicity will render the business unprofitable in Pennslyvania.

It is evident that many questions similar to those we have enumerated are state board questions and that there is much work for the state boards of this country to perform. It appears that there are now thirty-eight active state boards, which should stimulate those present to arrange a conference and at least prepare, through a committee, to bring before the conference in 1914 all the available data regarding state boards and the laws they were created to enforce, and particularly as to material differences between said laws and all questions that can be utilized by a conference of state boards for the general welfare of the profession at large.

THE PRESIDENT: We have heard a very excellent paper by Dr. Helmer, of Pennsylvania, and our program provides for the opening of the discussion of this paper by Dr. Mahaffy, of Delaware. Is Dr. Mahaffy here?

DR. MAHAFFY: Mr. Chairman and gentlemen, this paper so elegantly written and ably given by my friend and neighbor from Pennsylvania makes me hesitate a little in attempting to discuss it. The fact is that Pennsylvania formerly belonged to Delaware. We have three counties in Delaware now you know; some claim one at high tide and three at low tide. But Pennsylvania formerly belonged to our state and years ago we decided to let the plot of land go and take care of ourselves. Consequently, my name being on the program, I feel it is my duty to stand up and attempt at least to say something in regard to this particular paper.

Dr. Helmer showed it to me just before dinner and I thought of one or two points that I might bring out. The principal argument was urged against the federal license: I don't think that federal license is anything that we need. This country is bothered too much today by the federal government. If the federal government, in my opinion, would leave the states alone and let us take care of our own business we would be better off, and for pity's sake do let them alone on federal license.

The civil service examination requires that if you don't receive an appointment in a year you have to take another examination. Now, are we going to come along with a federal license and allow the veterinarians to practice the rest of their life time on one examination? I say leave the federal license alone. Has the worthy progress made in veterinary medicine in America been due to federal license or to men like Alexander Liautard or Andrew Smith? They have been very good men, but with all due respect to them I don't think that has been the cause of the improvement in the veterinary profession. Human nature is endowed with two great passions, one of them self-protection and the other reproduction. Just as soon as the American public begins to understand that the veterinary profession is essential in saving human lives by protecting the human race from the animal diseases, then will it become necessary for the veterinary profession to improve and try to take sides with the medical profession. It is just as necessary for veterinarians to be well equipped as the medical men.

He says here that the state board should have power to improve veterinary education. I would that the state board had the power to vastly improve veterinary education. I don't think there is any veterinarian—I say any, but nine-tenths of the veterinarians today are not as well educated as they should be in order to compare favorably with the medical profession—and just as soon as the state examining boards become severe enough and have laws to back them up and cause the faculties of the different colleges to have the students prepare themselves better, have a better preliminary education, just then will the state boards begin doing the duty which they owe to their state. In one particular place I remember Dr. Helmer says it is the duty of the state board to protect the practitioner. I think it is the duty of the state board to protect the public. It is just as important that the public be protected by the state board as the practitioner, and I know from experience that a great many of the students who come out of the colleges today are not practical men, are not well enough equipped and able to go out and give their clients their money's worth if they charge anyway near reasonable fees. I have seen students come from some colleges and I have seen them where they didn't know whether a horse's bit went into his mouth or under his tail, almost. You have all heard of a student from a Pennsylvania college who was called to see a cow. He stepped across the barnyard carefully, with his patent leather shoes on, and in the course of his questioning he asked how old the cow was, and the answer was eight or nine years old, and in a minute or two said, "Is this her first calf?" That is the kind of practitioners that many of the colleges are turning out today, and I say it is absolutely necessary that the state boards take a firm stand and cause the veterinary colleges to improve their courses.

Relative to the correspondence schools in London, it is such a long subject it would not do to talk on the veterinary correspondence schools this afternoon.

Now right here I would like to say a word about the previous paper where it could come in line with the state board. I have had more trouble in my practice from men who have taken so-called courses at agricultural schools than most any one else. I know it is true that the education, a certain amount of veterinary education, that these men get, causes them to want more, but unfortunately I think the exceptions almost exceed the rule and many of these men really think that they are entitled to practice, and why do they think so? Because the majority of them are more practical than are the veterinary students. The trouble with the students I see graduated from veterinary colleges today is that they are not practical; they should have practical work, and should be practical people if they expect to compete with the so-called quack.

One particular thing Dr. Helmer speaks about is the fact of Emerson's quotation about a man mending shoes. My recollection is, if he built a mouse-trap in the center of the woods the public would make a path to it. I think we should follow along the medical line; I remember the old medical men used to take the Hippocratic oath. The oath of Hippocrates is one that a medical man likes to have in his office and refer to, and a portion of it is that "we should so guard our lives and our thoughts, that we should conduct ourselves with propriety and if anything in our practice that we should see in regard to men or hear in regard to men that should not be heard by the public, those things would you keep in silence." Now there is a particular portion of that oath of Hippocrates that I think it would be well for the veterinary profession to remember. Carry out your life work with the same degree of carefulness that the medical profession does today. Place the medical profession as a landmark and our profession will generally improve.

The President: The next speaker on this paper is Dr. G. W. Smith, of Hoboken.

Dr. Smith: Mr. Chairman and Gentlemen: Dr. Helmer in his paper seems to have so thoroughly covered the field that it seems to me that there is nothing left for me to say. There are some points there that are very good ones. Dr. Helmer speaks of federal license. Federal license will come and may come, but I think at the present time we are not prepared for it. It is like reciprocity, following along in the trade line. Reciprocity is a good thing, but I think for the federal licensing of our candidates and practitioners we are not ready for it. And also along other lines, the doctor talked about young men, young candidates, taking examinations. I have known cases where a great many of these young men were very impractical and it seemed a pity; along some lines they had sufficient knowledge, but they lacked terribly in practical knowledge. There must be some reason for it. I know of one case where a candidate was asked to give a horse a bolus. He said he wouldn't put his hand down that horse's throat for the price of the horse. There are so many things here that are so well covered by these two gentlemen I shall not say any more. I thank you.

The President: The next speaker is Dr. Scott, of Peoria, Ill. Is he present? This now opens the paper to general discussion. We will be pleased to hear any discussion that you have to offer on this paper.

Dr. Hoskins: Mr. Chairman, there are two or three points in connection with this paper that interested me. In the first place I think we have an absolutely wrong conception of what we mean by a federal license. Any one who understands our government in this country knows that the federal government cannot enter the state without the consent of the state. More than twenty of the states having state license today make provision for those men engaged in the Bureau of Animal Industry and those engaged in the Army Veterinary Service to practice their profession or those parts of the profession that they are selected to do in these states without any opposition whatsoever or without having to comply even with the state laws. They are not required to take out any license and they are not required in any way to conform to these state laws.

The thought in connection with the federal license was that we would have one standard in our country. It is to get what Great Britain has in her country, a single standard, that gives the M.R.C.V.S. degree. The work is conducted in the colleges, the examinations are conducted by other boards and one degree is given. Our states will not permit that, but we might have a standard established as our civil service system is conducted today, and my thought in that connection was these examinations would be conducted by the civil service board just as they conduct them today for the various services of the B. A. I., and that they would conduct them in the same cities and under exactly like conditions. Now for the man who received a license a standard would be established just as high as if he had taken the examination especially for the federal meat inspection service or the quarantine service or the civil service in the Philippines, or the two positions in our army, one for those who are in the artillery and cavalry and the other for those in the quartermaster corps. It would not be compulsory nor would this federal license in any way give a man any right to go into any state and practice without the consent of that state board. The only thought was that he would not have to undergo an examination but he would comply with all other requirements of these several states. That is, he would simply pay the fee and then he would be granted the right. A man when he goes out of college is fitted to pass an examination. There is never any other time in his life when he is as well equipped to pass the examination. A man practices five or ten years in a state and for ill health or some other conditions or for family reasons or a host of circumstances it may necessitate his going to some other state and he finds the barrier of the state lines and he cannot go on without undergoing an examination. If he had a federal license and that state had agreed to accept a federal license in lieu of examination he might pay his fee and enter without difficulty. There isn't one man in fifty that is out of college ten to twenty years that can go to any state and pass the state board examination. Some states have been liberal enough to let men come in.

In the early history of the Pennsylvania state board she proposed to exercise her reciprocal powers, and we recognized the licenses of Ohio. We found they were imposing upon us in that direction and up to the time of my discontinuance on the board we did not grant any more. After a while the attorney-general in Ohio decided that they could not recognize the license of any other state. Maybe in a year or two another attorney-general would reverse that decision. If the federal license were in effect and it were established beyond any question of influence or beyond the domain of politics—and we men who have been in practical politics know the practice—it is no secret that I was driven off the board in Pennsylvania because of my political activities—it would help us. Recently that board passed a number of men. Eight of these men went to an adjoining state where an entire state board had been changed as the result of the political conditions or policy of that state, and six of those eight men failed on that examination. Now how are we to judge, who are outside the province of these boards, whether the board of Pennsylvania has lowered its standard or whether the board of New Jersey has raised hers? There is no way of judging. But, as I say, if there was a federal examination given and a federal license or federal certificate given, if we had that when a man went into Europe or a foreign country, it would be some indication of what veterinary education stood for in America.

If I go abroad next summer, as I hope to do, and I say to them I am a graduate of the American Veterinary College, what do the men abroad know of it? I tell them it is in New York. "Oh yes, we know where that is." And that is all they will know. If I tell them I have a license in Pennsylvania or a license under an act of Pennsylvania, they don't know the value of that at all.

And so it is with every school and every license. But there is one license that would have value and be accepted, and if once put into the cardinal act you get away from the dangers of a political board who are made many times to do many things that as men they wouldn't do. Take, for instance, the state of Illinois, where the board is entirely under the control of the board of cattle commissioners, and they have had general supervision. You will all remember that a very serious protest was made when they licensed two or three hundred more than they thought ought to be licensed. Do you mean to tell me, as a man who takes some part in practical politics, that those licenses were not granted because of political pressure? I have seen licenses in Pennsylvania given under like conditions, and I am prepared at any time to give the facts, but this is not the time. My home state is the place to state those things but not here.

Dr. Smith: When a man passes a civil service examination and does not get an appointment for a year, why does the government today require him to pass another examination? Oh, I take it back, they might be changing the standard of their requirements.

A Voice: Might not the veterinary examining board change their standards?

Dr. Smith: If one board is created all it requires is an appropriation from Congress. It might not be a permanent board. Once you give that license it would never change. For instance, if I possessed a federal license today the New York state board would not accept it. I could come to New York thirty years after I obtained the license and submit it as the evidence of my fitness to come into the state, and if the cardinal laws compelled me to pay a license fee I would pay the fee, but if I were to go before your board I couldn't pass the examination. I would not be able to. I have been out of college thirty years and it would make a great deal of difference.

Dr. Maloney: I want to express my approval of the paper presented by Dr. Helmer. The particular point that impressed me is this same federal license. Until the various states can present a clean straight line to the federal government of the federated states it is rather early to begin talking about federal licenses. All states are different in their laws. Each board interprets its own state law. The common end of all boards is to protect the public and those practitioners who are conscientiously carrying on their work. As the suggestion has crystallized itself through this meeting into the separate convening of examining boards, I think that the result will be a uniformity of examinations which will require, as well stated by Dr. Helmer, a uniformity of higher veterinary education. I think a whole lot of time may be lost in discussing a thing so far away as federal licenses. I should be very much opposed to federal licenses being conducted under the conditions in which civil service examinations are now being conducted, not only federal civil service examinations but various state examinations. Various state civil service examiners as a body are not competent to examine men in the various professions and work that is presented to them. They of their knowledge attempt to select men to provide examinations, and as was the instance in one state, a very prominent board required a veterinarian to select some of the questions. The veterinarian selected was not capable of making examination papers, and he went out and employed a federal meat inspector, who finally took the examination and passed number one. Suffice it to say that the board was an honorable board and did not consider the man. That is the way civil service examinations are conducted largely; civil service boards are not competent to examine the profession. Therefore each state must provide men, and she has plenty of men to make those examinations. On the other hand, in my opinion, we cannot solve that question of federal license.

DR. MAHAFFY: I don't think Dr. Maloney understands how the civil service commission conducts the examinations for veterinarians of the various departments.

DR. MALONEY: I understand that it provides certain examination papers provided from somewhere at their discretion.

DR. MAHAFFY: Yes. They are derived from the best veterinarians that they can possibly command.

DR. MURPHEY: In their opinion.

DR. MAHAFFY: If they take men who have been recognized in high official places and have served well for ten or twenty years, they have got to have confidence in them. Nobody has changed, you understand, the questions that have been propounded by men engaged in fitting men for the service. No one has changed the questions propounded for ten or twenty years for men entering the service in cavalry. We have had serious questions for those entering the quartermaster's service I acknowledge.

DR. MURPHEY: Who would change them?

DR. MAHAFFY: The profession would change them. I have changed them myself.

DR. MURPHEY: Has this American Veterinary Medical Association ever changed the methods employed by the United States Civil Service Commission?

Dr. Mahaffy: Not that I know of. Therefore we must have confidence in what they are doing, and the best evidence of that has been the continual increase in numbers and the higher and better service the veterinarians have done, insofar as interstate traffic in our products are concerned, and by enhancing the markets of the world for our food products. They have been able to drive the quarantine line two hundred thousand square miles further South by coöperating with the state service, and if enough money and men are provided the South claims today that they will take the other six hundred thousand square miles and rid them of the cattle tick. Now a service that has done that, and men that have been examined by the federal government for such service and have done such work as that and built up our great commerce is, I am sure, a body to be trusted. And the service brings forth such men not only to be trusted but to be sustained and upheld, with all its shortcomings and weaknesses.

The President: I don't believe there is any conflict in fact as between the thorn of the federal license and the work that these people engaged in state board work are conducting. I don't believe that there is a particle of conflict at all and I don't believe we can profitably devote our time to a discussion of that feature. If the federal service can be induced to undertake an examination that the state boards will accept very well and good, but there are a great many that will never take it and the state boards have their functions to perform and it is our object to devote our time to that function.

Dr. Murphey: I don't see how we are going to discuss the subject if we are going to be curbed immediately. The side issue was left by the previous speaker. I didn't attack the federal bureau in any sense of the word, but I do attack the methods of the civil service. If you will place the state board in the same powerful position as the B. A. I., all well and good, but until we are able to command the civil service and the machinations of politics we cannot expect fair and honest treatment from this civil service system.

The President: I shall look to the day soon when the influence of the state examining board will be such that the civil service examining boards will pay heed to any remarks that they may make, and they will then be glad to have the counsel of the various state boards. I don't believe there is any conflict in it. I do believe in Dr. Hoskins' idea, that some day a certificate may be issued broad enough to cover all requirements of state service and that you gentlemen will be pleased to accept it. That may come, but it is only a possibility of the future and not a thing that you and I can easily adjust now until we become correlated in a way and say to the civil service commission through governmental authorities that they may and shall establish an examination such as has been hinted at. We have got something now that we must do first. I don't want to cut short the discussion, Dr. Murphey, other than to conserve our time.

Dr. Murphey: My point is simply that it is useless to discuss federal license until our boys have established a line for themselves. Then we can dictate and determine to what extent the civil service will act for them.

The President: Has any one else anything to offer upon the paper of Dr. Helmer? Dr. Helmer, is there anything you would like to say in closing the discussion?

Dr. Helmer: Nothing further only that I am very much gratified with the interest that has been taken. I understand there is going to be a meeting of the State Boards of Medical Examiners right after this session, and we need to the utmost to conserve our time in order to prepare for that meeting.

The President: Gentlemen, this closes our regular program of all the papers that are here. There remains for us to elect officers for the ensuing year and make provisions for any incidental expenses in conducting the work of your secretary, whoever he shall be, and getting out a program and so on.

I appointed a committee on expenses, but the committee has never convened. The report of the secretary, who didn't come to the meeting, contains some items of expense, and I also submitted a statement of the expenses that I have incurred in his behalf for this meeting. If there are any members of the committee here I would like to have them look it over and find a way to meet those expenses.

Dr. Hoskins: Has any provision been made for paying the expenses already incurred?

The President: No.

Dr. Hoskins: Then I would recommend that each one of us individually contribute one dollar toward the expense of conducting this meeting. I understand Dr. Stewart has personally paid thirty dollars or forty dollars of his own. I make it as a motion.

A Voice: Second the motion.

The President: The question was moved and seconded that we contribute each one dollar to help the general fund to liquidate the expenses already incurred. Our committee if they are here might look and see what the expenses are.

Dr. Murphey: I am a member of the committee and Dr. Seeley is also a member, but he never called a meeting.

The President: Let us have a record of those who are contributing, that it may go into the *Proceedings*.

The names of the contributors are as follows:

E. W. Babson
A. H. Baker
Thomas Bland
O. L. Boor
S. Brenton
David Buckingham
Robert Dickson
District of Columbia Board
F. H. Douglass
H. P. Eves
C. T. Frey
J. T. Glennon
E. Hanshew
Jacob Helmer
W. H. Hoskins
L. H. Howard
Joseph Hughes
A. D. Knowles
G. W. Loveland
W. H. Lynch
A. J. McCloskey
J. R. Mahaffy
T. E. Maloney
Michigan Board
V. A Moore
H. S. Murphey
J. S. Pollard
S. R. Ramsey
W. H. Ridge
T. E. Robinson
J. W. Sallade
J. T. Seeley
G. W. Smith
George Stephens
S. Stewart

Dr. Maloney: I would like to make this announcement at this point, that at ten o'clock a preliminary meeting of the Examining Boards was held, so that the meeting called for this afternoon could be somewhat facilitated by some definite idea of what we are about to do. There were two or three resolutions adopted at that meeting that will be presented to the Board of Examiners as soon as they convene. I hope that all of the examiners will remain so that we may effect some organization.

The President: Now gentlemen, the selection of officers for this general Association is before you. In explanation let me say that there was a time when they were all faculty men. I have the original articles of agreement as to faculty men. But there were subsequently two societies, a faculty society and the state board society, and it was found fault that they were not making headway and they finally decided to combine the two into one society, and for several years we have been having a society of college faculties and state examining boards. I think I note here a tendency for a division again, that they can do better work if they will work separately and apart. So I suggest that you hold the two together another year in a common body, but if it is possible in your wisdom to do so when your officers are elected that they shall be picked for two separate sections, and we shall meet next year as a section of the American Veterinary Association, and if we are classified as a section, that one day be devoted to a faculty program and one day to an examining board program and one day to a joint program. Part of the time the officers have been state board men exclusively, part of the time college men exclusively, and part of the time mixed. I personally believe at this time that the officers should be selected entirely from among the board, and I feel sure that the college men will be only too glad if the state board men will select from their number the several officers provided for.

The first officer is to be president.

Dr. Maloney: I would like to carry out your line of thought and I am perhaps not going beyond my authority in saying that it was the consensus of the preliminary meeting this morning that there be no division of this properly constituted board of college men and examining boards. It was thought not wise to do that so far as those who were present were concerned, and it was thought best to remain as one body.

The President: I think it is a good idea to do that, but I do think that a separate section meeting will be helpful. Nominations for president are in order.

A Member: I nominate Dr. Stewart. (Seconded.)

The President: I have served here for several years at a very great sacrifice of time and energy and I hope you will not require me to continue.

(Voted to close the nomination.)

(Question on the nomination of Dr. Stewart for president put by Dr. Baker and carried.)

Dr. Stewart: Gentlemen, I thank you for this confidence. I assure you that my heart is in this work. I want to see this Association do things.

I have attended meeting after meeting and we haven't done much except to train ourselves into the fact that we didn't quite know how. We now know how and I look forward to things being accomplished.

You need two vice-presidents and a secretary. I suggest the selection of a secretary first; if you can get a good secretary whose heart would be in the work I feel that you will accomplish much more than if you elect one who cannot give it much attention.

A Member: I nominate Dr. Helmer. (Seconded.)

(Voted that the nomination be closed.)

The President: The nomination of Dr. Helmer is before you.

(Question put by the president and carried.)

The President: Dr. Helmer is elected secretary.

Dr. Helmer: I thank you gentlemen for the honor conferred upon me.

I don't think it will be necessary for those who know me to make any promise, but I will try to fill the arduous duties intrusted to me.

The President: We have also to congratulate ourselves upon Dr. Helmer's selection.

Whom will you nominate for first vice-president?

A Member: I would like to offer the name of Dr. Babson, of Massachusetts. (Motion seconded.)

The President: If there are no further nominations I declare the nomination closed.

(Question on the name of Dr. Babson put and carried.)

The President: Dr. Babson has been elected first vice-president. Now second vice-president, who will you have for second vice-president?

A Member: I nominate Dr. H. P. Eves, of Delaware. (Motion seconded.)

The President: Any further nominations? I declare the nominations closed.

(Questions put on the name of Dr. Eves, and carried.)

The President: This fills the official positions and completes the business other than that we hear from the committee on finance, the auditing committee.

Dr. Jacob: Mr. Chairman and gentlemen. I beg to report that the auditing committee went over the report of the secretary and treasurer very carefully and found it to be correct. It has the approval of the three members of the committee. Furthermore we have the bill of expense here of Dr. Stewart, who incidentally took up the work of Dr. Nelson, and this bill of expense was approved by the entire committee. We suggest that the money which is now in the treasury be paid over to the committee and if it is not sufficient that we make up the deficiency by contribution.

The President: Will the secretary-treasurer elect look into this matter and see what the situation is.

Dr. Helmer: The total indebtedness that I find on this sheet is $71.25, and in these papers I find a check attached for $12.33, leaving a balance to be collected of $58.92. There is an item for expressage here that Dr. Stewart has said on the side that he will take care of. What is the amount of that, Dr. Stewart?

Dr. Stewart: I haven't any idea. It was some stuff that I had shipped here because I couldn't carry it. It is a small sum, I will take care of it.

Dr. Helmer: $58.92 is the balance that we should raise.

Dr. Jacob: The committee left that part open so it could be paid to Dr. Stewart afterward.

The President: There has been contributed very generously the sum of thirty-five dollars. There are members who have been in and out who would gladly contribute if it was brought to their attention that there were funds needed to carry on this work. I think anything left due can be safely left over and information sent out from the secretary telling what has been done here, and inviting the coöperation of the board not represented and calling attention to the need of such funds, and perhaps calling attention to those who had voluntarily contributed a dollar each and it might yield you adequate funds to carry on the next year's work.

I am looking forward to a very excellent year of progress in this particular Association. I am looking forward to it because of the interest you have shown here and because of the wisdom you have exercised in selecting the real executive officer of a body like this, your secretary. And I shall hope when we meet again, whether it be in New Orleans or some other city, that we shall have done a wonderful work for our year. We have reached the time for fruitage.

As to the committee that was appointed in response to a motion made by Dr. Murphey, I don't know what the boards feel about them, but this committee appointed were entirely board men, and if the body of veterinarians assembled can support that particular committee I believe that you will do wisely and further the work in hand.

Now I am going to withdraw that you may hold your meeting[1] of board examiners exclusively. I thank you for your interest and confidence.

Dr. Mahaffy: Mr. Chairman, with your permission and before closing this session I desire to present a resolution.

Resolved, That it is the sense of this Association that we heartily commend the Delaware State Veterinary Medical Association for its action in upholding the veterinary profession by contesting the right of a non-graduate to hold the position of state veterinarian and member of the State Board of Veterinary Medical Examiners respectively.

The President: You have heard the resolution of Dr. Mahaffy of Delaware. What is your pleasure?

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[1] At this meeting a subsection, the Association of State Examining Boards, was formed.

A MEMBER: Mr. President, I move you that the resolution be adopted and ordered spread upon the minutes of this meeting.

THE PRESIDENT: Are you ready for the question? Question. All in favor signify it by saying, "aye," Contrary, "no." The ayes have it. The resolution is carried.

Final adjournment at 4.06 P.M.

SOCIAL FEATURES AT NEW YORK CITY

By Nellie C. Berns
Brooklyn, N. Y.

Among the various functions and entertainments for the ladies and visitors who attended the Fiftieth Anniversary Meeting in New York City, the following is a brief outline of the many pleasing events provided by the Anniversary Committee:

On Monday morning, September 1, the ladies attended the opening of the convention and were entertained by the various addresses delivered. At two o'clock in the afternoon they met in the Laurel Room of the Hotel Astor, and went to visit the steamship *Lusitania*, which was thoroughly inspected from engine room to Imperial suite. A ride up Fifth Avenue finished the afternoon. In the evening an informal gathering of the ladies took place in the hotel parlors, giving everyone a chance to renew old friendships.

Tuesday morning, nine-thirty, we started for Coney Island. Special cars conveyed us across the Brooklyn Bridge, through Brooklyn and its suburbs to Brighton Beach. A pleasant walk along the ocean took the ladies to the bathing pavilion, where those who desired to take "a dip" were given the opportunity. The walk was then continued to the part of Coney Island that has made it world-renowned, the "West End," or the real Coney Island. Luncheon was served in the German Garden at Feltmann's, after which we proceeded to the wonders and mysteries of Luna Park to the evident amusement of all. The reception and dance were held that evening in the East Ballroom of the Hotel Astor, and despite the strenuous exertion of the afternoon all looked bright and smiling and ready to participate in the pleasure.

Wednesday morning saw our party starting for the Zoölogical Garden, Bronx Park. In the afternoon a concert was given in the Auditorium of John Wanamaker's, after which guides took the ladies and a few of the gentlemen through the various departments of that wonderful store.

Thursday was the one day when the gentlemen participated in the entertainment with us. A large iron steamboat, the *Rosedale*, carried the entire party up the Hudson River as far as Spuyten Duyvil, passing the beautiful homes on Riverside Drive, Grant's Tomb, and the Palisades. Turning, the boat then steamed down through the lower bay, past the Statue of Liberty and Ellis Island, through the Narrows, passing between Forts Hamilton and Wadsworth, out on the broad Atlantic Ocean. That evening was the banquet, a very beautiful affair, served in the North Ballroom of the Hotel Astor.

At the close of the elaborate menu the Chairman of the Fiftieth Anniversary Committee, Dr. W. Horace Hoskins, in the capacity of toastmaster, called upon the following speakers: Dr. William A. Evans, Northwestern University, Chicago, Ill.; Dr. William H. Park, City Board of Health, New York City; Hon. E. C. Snyder, Washington, D. C.; Hon. David Warnock, Alberta, Canada; Dr. M. P. Ravenel, University of Wisconsin, Madison, Wis.; President-elect C. J. Marshall; President John R. Mohler; Ex-President, F. H. Osgood; and Secretary-elect, Nelson S. Mayo. This function of the meeting was voted a big success by all those who attended it.

Friday was devoted to sightseeing in the city. Small parties were arranged, each in charge of one of the local committee, who endeavored to show her party that which seemed of most interest to them. Then the good-byes—but with the regret of parting came the anticipation of meeting again, and here's to New Orleans, 1914!

LETTERS OF APPRECIATION RECEIVED

Space will not permit the publication of all the letters of felicitation received on the occasion of our fiftieth anniversary. In addition to those recorded below, similar letters of congratulation were forwarded by Professors Bernard Bang, John McFadyean, Stewart Stockman, A. E. Mettam, Edoardo Perroncito, Jan Poels, William H. Welch, Herman M. Biggs, J. H. Raymond, Dr. E. Wallis Hoare, Dr. W. C. Woodward, Prof. George M. Rommel, the late Senator Johnston, Representative Hay, Commissioner Calvin J. Huson, the late Mayor William Gaynor, and several others.

Fort Atkinson, Wis., July 21, 1913.

My dear Doctor:

I have your most thoroughly appreciated letter of the 18th. I have already had some correspondence with Secretary Marshall and wrote him on the 16th that my health was too poor to accept his kind invitation. The fact is, I am afflicted with a bronchial trouble that prevents me from doing any more public speaking, and have to answer all my correspondence by first writing out my reply in pencil.

Of course, you know that my spirit is willing even though the flesh is weak. I would appreciate so much being with you on the occasion named and especially of being privileged to meet you personally once more, for I have not forgotten our old days of conference together in the International Tuberculosis Commission. But my age—77—and what St. Paul calls the "oft infirmities of the flesh" admonish me that my public work is about done.

With much gratified appreciation for the kindly sentiments expressed in your letter, I remain,

Yours sincerely,

W. S. Hoard.

Dresden, July 24, 1913.

Highly Esteemed Mr. President:

Your good and exceedingly kind invitation to the fiftieth assembling of the American Veterinary Medical Association is received. The opportunity which you give me to attend the jubilee gathering of your world-renowned scientific body is for me a very great honor and an especial distinction for which I wish to express to you and your entire Association my heartiest and most deeply felt thanks. I have been a constant admirer of America and the Americans and particularly prize their energetic scientific and practical accomplishments in the domain of veterinary medicine. For this reason I would the more gladly have made the necessary journey for attending this important gathering of your Association, but my health will not permit me to undertake the voyage to New York. I have recently been suffering from acute articular rheumatism and my physician strongly advises me to begin a five weeks' course of treatment at the baths of Wildbad when my vacation begins early in August. It would, therefore, be impossible for me to be in New York at the proper time. As soon as your kind invitation was received, I laid the matter before my physician and asked for his advice. He replied that he considered the bath treatment absolutely necessary in my case. Under these circumstances I am obliged, although greatly to my regret, to give up my trip to New York, and to write to you that I cannot be present with you. I hope that because of the state of my health and the distance of my home from New York you will kindly excuse me from attending.

I especially regret that I must give up the honor of participating in your meeting, because I had hoped that through a dissertation on enzoötic encephalomyelitis of horses, I should be able to present to the members of your Association something which would be of interest to them, since a similar disease has made its appearance in your land. I am confident, however, that the disease in your country is of different etiology.

Therefore I repeat to you, Mr. President, my heartiest and most sincere thanks, and with the expression of my highest respects, I am yours, very devotedly,

E. Joest.

Budapest, December 24, 1912.

My dear Colleague:

I was very agreeably surprised with your recent letter in which you so very kindly extended to me the honoring invitation of your Association to attend the meeting of the fiftieth anniversary. It certainly would have been a great pleasure for me if I could have taken part at that meeting, where I would have had the opportunity of making the personal acquaintance of my American colleagues and at the same time seeing the beautiful country of the United States. However, I sincerely regret being unable to make the long journey across the great water on account of my numerous engagements and also my advancing age.

Therefore, I have to deprive myself of that pleasure and at the same time I would most kindly request you to express my deepest gratitude to the members of your great Association for the honoring invitation, and please express my regrets for not being able to be present at the celebration. Please give them my assurance that I highly honor the attention they have shown me, and that the invitation will always remain one of the most pleasant incidents of my life.

With kind regards, I am,

Very sincerely yours,

Francis Hutyra.

May 8, 1913.

DR. JOHN R. MOHLER.

My dear Colleague: Please accept my sincerest and heartiest thanks for your renewed kind invitation to the celebration of the fiftieth anniversary of your Veterinary Association. I have such splendid and pleasant recollections of America and my American colleagues that I would have gladly visited you in order to celebrate with you the occasion. But to my regret, I must depart in July for Africa (German East Africa) in order to satisfy myself of the progress which is being made in the control of rinderpest, and very likely I will have to remain there until the end of the year. Postponing, however, is not abandoning, and if to my great regret I cannot come at present, I will visit you on an early occasion.

I wish great success to the celebration of your Association, and send my best regards to the gentlemen of your Association, and with personal regards to yourself, I am,

Very truly yours,

ROBERT OSTERTAG.

LEYDEN, HOLLAND, August 12, 1913.

DEAR DR. MOHLER:

I think Dr. Meyer will have cabled you already that in these circumstances it was quite impossible for me to accept the very honoring invitation of the American Veterinary Medical Association.

In the first place, being not in Leyden, I received your kind invitation only on August 1, while the time of the visit of Dr. Meyer was announced on the 5th. Under these circumstances I had too short a time to prepare for the trip, because I had to travel on the 15th, so that I could not arrange my business.

Then, I should have liked to take my wife with me, and to have the opportunity to see a little more of the United States.

However, I can say that I am very, very sorry. I should have liked to see your country and our colleagues there, and in particular yourself. Your name is very well known in Europe and in Holland, and it would have been a great honor for me to pronounce an address on tuberculosis, the subject that is so well known by you. In particular I could have made new communications on avian tuberculosis in mammalians, on which theme you have published yourself.

But indeed I assure you that the short time and the other points already mentioned formed an insurmountable obstacle.

I hope that in the future I may have once more an occasion to visit your country and to make acquaintance with my learned colleagues. Indeed, I repeat that I am very sorry that I must let pass this occasion.

I beg you to excuse me to your Association and to accept the assurances of my kindest compliments,

D. A. DE JONG.

WASHINGTON SQUARE, NEW YORK, July 22, 1913.

MY DEAR DR. MOHLER:

It is peculiarly gratifying to me to be invited to address the American Veterinary Medical Association at its fiftieth anniversary meeting, and I keenly regret that I am unable to accept the invitation. I am just about leaving New York for a little vacation, and according to my present plans I shall be away from the city at the time of your meeting.

I have been particularly interested of late in the subject of veterinary education, and it would have given me much pleasure to participate in your meeting if I could have done so.

Thanking you very warmly for the invitation, and with all good wishes for your meeting, I am, believe me,

Very sincerely yours,

ELMER E. BROWN.

BUDAPEST, June 3, 1913.

MY DEAR COLLEAGUE:

Kindly accept my most sincere and hearty thanks for your letter of May 22, in which you extended to me the great honor of inviting me to attend the celebration of the fiftieth anniversary of your Association. Please be kind enough to express this sentiment to your Association with my most respectful regards.

I am very sorry that it will be impossible for me to visit America on this occasion. I must depart in August for London as the Government representative to the International Congress of Medicine, and later I have to meet other official obligations which will keep me in Europe.

Again please accept my best thanks and heartiest fraternal regards.

Very sincerely yours,

PROF. L. v. LIEBERMANN.

DEAR DR. MOHLER:

Yesterday returning from a visit in Norway, I received your kind and honorable invitation to attend the meeting of the American Veterinary Medical Association as a guest of the Association. I thank you very much and am sorry that I cannot accept your kindness. My old mother has been seriously ill for about half a year, and is now so weak that her death may come, I think, in the course of one or two months. You will understand that I cannot leave Denmark for any length of time this summer.

Perhaps you are coming to London next year; it would give me great pleasure personally to thank you for the great honor which you and the Association have conferred on me.

Very respectfully yours,

C. O. JENSEN.

THE PATHOLOGICAL EXHIBIT

One of the most instructive as well as interesting features of the meeting was the pathological exhibit in College Hall. This collection of pathological specimens, embracing nearly all the diseases of cattle, sheep and swine, were the most beautifully prepared and mounted specimens that it has been our pleasure and privilege to examine, and we believe that was the general impression of those present. The members and visitors at the A. V. M. A. meeting had the privilege of examining this rare collection, the property of the United States Bureau of Animal Industry, through the courtesy of President John R. Mohler, of the A. V. M. A., Chief of the Pathological Division of the B. A. I.

The exquisite work in the preparation of this collection of watch-glass specimens, we understand, was executed by one of our A. V. M. A. members, who was present at the meeting but whose modesty restrained him from mentioning the fact, even when present at the exhibit, as he occasionally was, and would quietly explain some particular specimen to an inquiring visitor. We refer to Dr. L. Enos Day, Veterinary Inspector, in charge of the Branch Pathological Laboratory of the Bureau of Animal Industry at Chicago. Dr. Day certainly is to be complimented on his exquisite work, and deserves a vote of thanks from the entire veterinary profession of America.

In addition to the above exhibition numerous chilled fresh specimens were displayed at one of the large abattoirs under federal inspection. This exhibit was prepared under the direction of Dr. N. L. Townsend, Inspector-in-Charge at New York City, and the specimens collected showed a great variety of lesions of tuberculosis of hogs and cattle, hog cholera, actinomycosis, and various lesions of the liver, kidneys, spleen, heart, skin, and other tissues.

Exhibit of Horses' Shoes and Hoofs

Also in College Hall, just opposite the pathological exhibit of the U. S. Bureau of Animal Industry, there was a most interesting collection of horseshoes of various designs to overcome certain diseased conditions and incorrect forms of hoofs; also quite a number of dry specimens of diseased and deformed hoofs. This interesting exhibit was kindly loaned by the Veterinary School of the University of Pennsylvania.

American Veterinary Review.

REGISTRATION AT THE FIFTIETH CONVENTION, NEW YORK CITY, 1913

MEMBERS

ALABAMA.—Chas. J. Becker, C. A. Cary.

CALIFORNIA.—R. A. Archibald, P. H. Browning, David F. Fox, C. M. Haring, Oscar Kron.

CANADA.—M. C. Baker, A. A. Etienne, M. V. Gallian, E. A. A. Grange, John W. Grover, Charles H. Higgins, William A. Hilliard, J. B. Hollingsworth, D. McCuaig, C. D. McGilvray, R. D. Macintosh, A. E. Moore, Roy Riddle, Thomas Thacher, F. Torrance, D. Warnock, E. A. Watson.

COLORADA.—Charles G. Lamb.

CONNECTICUT.—Harry E. Bates, Thomas Bland, Chas. L. Cotton, J. F. Deveraux, A. T. Gilyard, P. T. Keeley, D. R. Kensey, A. C. Knapp, Valentine M. Knapp, G. W. Loveland, Edward H. Morris, H. Reilly, Oscar Schrenk, R. S. Todd, Mulford C. Thompson, Wallace F. Vail.

DELAWARE.—H. P. Eves, Arthur S. Houchin,

DISTRICT OF COLUMBIA.—D. E. Buckingham, W. E. Cotton, Adolph Eichhorn, A. M. Farrington, R. W. Hickman, J. R. Mohler, G. M. Potter, J. Traum, John P. Turner, B. T. Woodward.

GEORGIA.—W. M. Burson, T. E. Jaga.

ILLINOIS.—A. H. Baker, S. S. Baker, D. M. Campbell, L. Enos Day, O. E. Dyson, R. F. Eagle, W. B. Holmes, Joseph Hughes, Geo. B. Jones, Geo. B. McKillip, L. A. Merillat, J. T. Nattress, H. D. Paxon, A. T. Peters, James Robertson, John F. Ryan, H. B. Schwarze, James Smellie, C. H. Taylor, Cassius Way, John L. White.

INDIANA.—John B. Archer, F. A. Bolser, L. O. Boor, E. M. Bronson, W. B. Craig, J. O. Gresson, W. F. Myers, S. V. Ramsey, Sr., G. H. Roberts, T. A. Sigler.

IOWA.—H. E. Bemis, H. D. Bergman, G. A. Johnson, H. S. Murphey.

KANSAS.—Geo. F. Babb, F. S. Schoenleber, C. J. Sihler.

KENTUCKY.—R. Moody.

LOUISIANA.—W. H. Dalrymple, F. J. Douglass, Hamlet Moore.

MAINE.—A. Joly, W. H. Robinson, Geo. F. Wescott.

MARYLAND.—J. P. Aikenhead, Joseph P. Grogan, Herbert Hoopes, J. Huebschmann, Samuel E. Lloyd, Frank H. Mackie, C. E. Poe, E. C. Schroeder, R. V. Smith.

MASSACHUSETTS.—Francis Abele, Jr., E. W. Babson, C. R. Bodren, M. J. Curran, W. H. Dodge, William J. Hennessey, Lester H. Howard, Thos. E. Maloney, F. A. Miller, F. H. Osgood, L. A. Paquinn, Chas. H. Perry, Jacob G. Pfersick, Benj. D. Pierce, Harry W. Pierce, W. T. Pugh, J. H. Roberts, J. W. Robinson, W. M. Simpson, William T. White, J. F. Winchester.

Michigan.—S. Brenton, F. W. Chamberlain, C. C. Dauber, J. S. Donald, Geo. W. Dunphy, G. D. Gibson, Ward Giltner, Wm. Hansen, Theodore F. Krey, Richard P. Lyman, John M. Miller, A. B. Sexsmith, H. E. States, R. H. Wilson.

Minnesota.—Charles E. Cotton, G. E. Leech, F. E. Palmer, M. H. Reynolds, C. S. Shore, S. H. Ward.

Mississippi.—E. M. Ranck,

Missouri.—F. F. Brown, F. W. Caldwell, H. Jensen, A. T. Kinsley, S. Stewart, A. Trickett.

Montana.—A. D. Knowles.

North Carolina.—L. H. Herring, G. A. Roberts.

North Dakota.—R. E. Shigley.

New Jersey.—L. J. Belloff, R. W. Carter, Henry W. Denton, Robt. Dickson, William Gall, James T. Glennon, W. F. Harrison, John B. Hopper, J. Huelsen, J. Payne Lowe, Wm. Herbert Lowe, James McDonough, Rudolf F. Meiners, E. W. Newcomer, H. W. Read, M. J. Reagan, W. Runge, Chas. L. Schloener, Geo. H. Smith, Thos. E. Smith, Geo. B. Vliet, Andrew G. Vogt, Henry S. Weber.

New York.—E. B. Ackerman, F. W. Andrews, Samuel Atkinson, Geo. H. Berns, W. Reid Blair, Alfred F. Bollinger, H. W. Boyd, S. H. Burnett, Henry Cady, Chas. S. Chase, W. J. Coates, David W. Cockran, David Comstock, J. Elliott Crawford, A. L. Danforth, J. D. DeRonde, Frank P. Devine, J. F. DeVine, Frank P. Dorian, Robt. W. Ellis, Otto Faust, Pierre A. Fish, C. P. Fitch, Harry D. Gill, J. L. Halloran, E. Hanshew, Herbert F. Harmes, Thomas J. Herr, W. G. Hollingworth, Wilson Huff, Frank Hund, J. H. Jacobus, Frederic S. Jones, R. H. Kingston, Ralph V. Knight, William Henry Kelly, George A. Knapp, Charles Lynch, W. J. McKinney, Robert S. MacKellar, D. J. Mangan, W. B. Maxson, H. J. Milks, H. K. Miller, J. F. Miller, V. A. Moore, Percival K. Nichols, C. D. Pearce, M. M. Poucher, Edward Rafter, J. E. Ryder, W. J. Schumaker, C. E. Shaw, C. W. Shaw, Alexander Slawson, E. F. Sanford, Thomas Seldon, G. T. Stone, J. B. Thompson, Albert N. Towne, A. G. Wicks, W. L. Williams, J. G. Wills, J. W. Young.

Ohio.—W. A. Axby, Jos. F. Barnes, J. H. Blattenberg, C. H. Case, A. S. Cooley, J. M. Cooper, John D. Fair, Paul Fischer, Chas. E. Hershey, J. C. Meyers, A. D. Miller, John V. Newton, H. B. Rapp, L. A. Severcool, Edgar H. Shepard, W. B. Washburn, David S. White.

Oregon.—William H. Lytle.

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Miller, P. F. Murphy, C. B. Palmer, Herbert F. Palmer, Edgar W. Powell, R. M. Quigley, Edward Records, John Reichel, J. H. Reifsnyder, W. H. Ridge, W. L. Rhoads, C. A. Schauffler, Fred. H. Schneider, J. W. Salade, B. F. Senseman, R. M. Staley, H. W. Turner, S. E. Weber, W. E. Wight, E. H. Yunker,

Rhode Island.—J. M. Armstrong, Chas. T. Frey, J. S. Pollard, T. E. Robinson.

South Carolina.—Benj. McInnes.

Tennessee.—M. Jacob, J. A. Kiernan, J. W. Scheibler, Geo. R. White.

Vermont.—T. H. Rich, Guy N. Welch, E. J. Wills, J. G. Whiting.

Virginia.—W. G. Chrisman, R. R. Clark, James G. Ferneyhough, Thomas Fraser, Joseph N. Hornbaker, N. S. Mayo.

Washington.—J. T. Seeley.

West Virginia.—J. J. Connell, H. B. Langdon.

Wisconsin.—A. E. Behnke, H. F. Eckert, O. H. Eliason, H. D. Pattison, M. P. Ravenel, J. P. West.

Wyoming.—B. F. Davis.

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Iowa.—Tom Downing, J. I. Gibson.

Kansas.—William Hoffman.

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South Carolina.—Mrs. John H. Moore.

Tennessee.—Mrs. M. Jacob, Mrs. J. Scheibler.

Texas.—Mrs. George Stephens.

Virginia.—Mrs. Thomas Fraser, Mrs. W. D. Yarbes.

Wisconsin.—Mrs. H. F. Eckert.

MEETINGS

1863. First Meeting, New York, N. Y. June 9 and 10.
1864. Semiannual (comitia minora)—New York, N. Y., January 19.
Annual—New York, N. Y., September 6.
1865. Semiannual—New York, N. Y., March 7.
Annual—Boston, Mass., September 5.
1866. Semiannual—New York, N. Y., March 5 and 6.
Annual—New York, N. Y., September 4.
1867. Semiannual—Boston, Mass., March 5.
Annual—New York, N. Y., September 3.
1868. Semiannual—New York, N. Y., March 5.
Annual—Boston, Mass., September 1.
1869. Semiannual—Boston, Mass., March 16.
Annual—New York, N. Y., September 21.
1870. Semiannual—Philadelphia, Pa., March 15 (no quorum).
Annual—New York, N. Y., September 20.
1871. Semiannual—Boston, Mass., March 21.
Annual—New York, N. Y., September 19.
1872. Semiannual—Boston, Mass., March 16.
Annual—New York, N. Y., September 17.
1873. Semiannual—Boston, Mass., March 17.
Annual—New York, N. Y., September 16.
1874. Semiannual—Boston, Mass., March 17.
Annual—Not held, owing to error in date of notices sent out.
1875. Semiannual—Boston, Mass., March 25.
Annual—New York, N. Y., September 21.
1876. Semiannual—Boston, Mass., March 21.
Annual—New York, N. Y., September 10.
1877. Semiannual—Boston, Mass., March 20.
Annual—New York, N. Y., September 18.
1878. Semiannual—Boston, Mass., March 19.
Annual—New York, N. Y., September 17.
1879. Semiannual—Boston, Mass., March 18.
Annual—New York, N. Y., September 16.
1880. Semiannual—Boston, Mass., March 16.
Annual—New York, N. Y., September 1.
1881. Semiannual—Boston, Mass., March 13.
Annual—New York, N. Y., September 20.
1882. Semiannual—Boston, Mass., March 21.
Annual—New York, N. Y., September 19.
1883. Semiannual—Boston, Mass., March 20.
Annual—New York, N. Y., September 18.

1884. Semiannual—Boston, Mass., March 18.
Annual—Cincinnati, Ohio, September 16.
1885. Semiannual—Boston, Mass., March 17.
Annual—New York, N. Y., December 15.
1886. Semiannual—Boston, Mass., No legal meeting held (no quorum).
Annual—New York, N. Y., September 21.
1887. Semiannual—Philadelphia, Pa., March 15.
Annual—New York, N. Y., September 20.
1888. Semiannual—Baltimore, Md., March 20.
Annual—New York, N. Y., September 18.
1889. Semiannual—Boston, Mass., March 19.
Annual—Brooklyn, N. Y., September 17.
1890. Chicago, Ill., September 16 and 17.
1891. Washington, D. C., September 15 and 16.
1892. Boston, Mass., September 20, 21 and 22.
1893. Chicago, Ill., October 17, 18, 19 and 20.
1894. Philadelphia, Pa., September 18, 19 and 20.
1895. Des Moines, Iowa, September 10, 11 and 12.
1896. Buffalo, N. Y., September 1, 2 and 3.
1897. Nashville, Tenn., September 7, 8 and 9.
1898. Omaha, Neb., September 6, 7 and 8.
1899. New York, N. Y. September 5, 6 and 7.
1900. Detroit, Mich., September 4, 5 and 6.
1901. Atlantic City, N. J., September 3, 4, and 5.
1902. Minneapolis, Minn., September 2, 3 and 4.
1903. Ottawa, Canada, September 1, 2, 3 and 4.
1904. St. Louis, Mo., August 16, 17, 18 and 19.
1905. Cleveland, Ohio, August 15, 16, 17 and 18.
1906. New Haven, Conn., August 21, 22, 23 and 24.
1907. Kansas City, Mo., September 10, 11, 12 and 13.
1908. Philadelphia, Pa., September 8, 9, 10 and 11.
1909. Chicago, Ill., September 7, 8, 9 and 10.
1910. San Francisco, Cal., September 6, 7, 8 and 9.
1911. Toronto, Canada, August 21, 22, 23 and 24.
1912. Indianapolis, Indiana, August 27, 28, 29 and 30.
1913. New York, N. Y., September 1, 2, 3, 4 and 5.

PRESIDENTS

1863–1864.	J. H. Stickney, Massachusetts
1864–1865.	A. S. Copeman, New York.
1865–1866.	C. M. Wood, Massachusetts.
1866–1867.	R. H. Curtis, New York.
1867–1869.	R. Wood, Massachusetts.
1869–1871.	E. F. Thayer, Massachusetts.
1871–1875.	A. Large, New York.
1875–1877.	A. Liautard, New York.
1877–1879.	C. P. Lyman, Massachusetts.
1879–1881.	J. L. Robertson, New York
1881–1883.	W. Bryden, Massachusetts.
1883–1885.	W. B. E. Miller, New Jersey
1885–1886.	L. McLean, New York.
1886–1887.	A. Liautard, New York.
1887–1889.	R. S. Huidekoper, Pennsylvania
1889–1890.	C. B. Michener, New York.
1890–1892.	R. S. Huidekoper, Pennsylvania.
1892–1893.	W. L. Williams, Indiana.
1893–1896.	W. Horace Hoskins, Pennsylvania.
1896–1897.	F. H. Osgood, Massachusetts.
1897–1898.	D. E. Salmon, District of Columbia.
1898–1899.	A. W. Clement, Maryland.
1899–1900.	Leonard Pearson, Pennsylvania.
1900–1901.	Tait Butler, Indiana.
1901–1902.	J. F. Winchester, Massachusetts.
1902–1903.	S. Stewart, Missouri.
1903–1904.	R. R. Bell, New York.
1904–1905.	M. E. Knowles, Montana.
1905–1906.	W. H. Lowe, New Jersey.
1906–1907.	James Law, New York.
1907–1908.	W. H. Dalrymple, Louisiana.
1908–1909.	J. G. Rutherford, Ontario, Can.
1909–1910.	A. D. Melvin, District of Columbia.
1910–1911.	G. H. Glover, Colorado.
1911–1912.	S. Brenton, Michigan.
1912–1913.	J. R. Mohler, District of Columbia.
1913–1914.	C. J. Marshall, Pennsylvania.

SECRETARIES

1863.	A. Liautard, New York.
1864.	R. Jennings, New Jersey.
1865–1867.	C. Burden, New York.
1867–1869.	J. F. Budd, New York.
1869–1874.	J. L. Robertson, New York.
1874–1877.	J. D. Hopkins, New Jersey.
1877–1880.	A. A. Holcombe, New York.
1880–1888.	C. B. Michener, New York.
1888–1893.	W. Horace Hoskins, Pennsylvania.
1893–1894.	T. J. Turner, Missouri.
1894–1895.	Leonard Pearson, Pennsylvania.
1895–1902.	S. Stewart, Kansas and Missouri.
1902–1906.	John J. Repp, Iowa and Pennsylvania.
1906–1910.	Richard P. Lyman, Connecticut and Missouri.
1910-1913.	C. J. Marshall, Pennsylvania.
1913–1914.	Nelson S. Mayo, Illinois.

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Colorado—Charles G. Lamb, Denver.
Connecticut—G. W. Loveland, Torrington.
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Nevada—W. B. Mack, Reno.
New Hampshire—G. E. Chesley, Rochester.
New Jersey—J. Payne Lowe, Passaic.
New Mexico—Marion Imes, Albuquerque.
New York—C. D. Pearce, Buffalo.
North Carolina—A. S. Wheeler, Biltmore.
North Dakota—W. F. Crewe, Bismarck.
Ohio—J. D. Fair, Millersburg.
Oklahoma—Charles H. Jewell, Fort Sill.

Oregon—W. Dean Wright, Portland.
Pennsylvania—F. H. Schneider, Philadelphia.
Philippine Islands—A. R. Ward, Manila.
Porto Rico—Carlos Ortiz, Ponce.
Rhode Island—John S. Pollard, Providence.
South Carolina—B. Kater McInnes, Charleston.
South Dakota—Stanley W. Allen, Watertown.
Tennessee—John A. Kiernan, Nashville.
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Utah—H. J. Frederick, Logan.
Vermont—F. A. Rich, Burlington.
Virginia—George C. Faville, North Emporia.
Washington—J. T. Seeley, Seattle.
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Wisconsin—W. G. Clark, Marinette.
Wyoming—Otto L. Prien, Laramie.

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Manitoba—R. D. Macintosh, Winnipeg.
New Brunswick—D. McQuaig, McAdam Junction.
Nova Scotia—William Jakeman, Glace Bay.
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Prince Edward Island—W. H. Pethick, Charlottetown.
Quebec—A. A. Etienne, Montreal.
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SOUTH AMERICA

Brazil—John H. McNeil, Sao Paulo.

HONOR ROLL REVISED, 1913

ALLEN, F. S., elected 1884.
BATH, W. H., elected 1884.
BERNS, G. H., elected 1884.
BLAND, THOMAS, elected 1887.
BRIDGE, FRANCIS, elected 1887.
BUTLER, TAIT, elected 1887, President 1900–01.
COATES, W. J., elected 1877.
CROWLEY, C. W., elected 1876.
CURTICE, COOPER, elected 1888.
EMERSON, DANIEL, elected 1888.
HARRISON, R. H., elected 1881.
HOLLINGWORTH, G. W., elected 1885.
HOSKINS, W. H., elected 1882, Secretary 1888–93, President 1893–96.
HOWARD, L. H., elected 1882.
JACOBUS, J. H., elected 1888.
LIAUTARD, A., Organizer 1863, Secretary 1863–1864, President 1875–77 and 1886–87.
LOWE, WM. HERBERT, elected 1886, President 1905–06.
LYFORD, C. C., elected 1884.
McINNES, B., elected 1876.
McLEAN, C. COURTNEY, elected 1887.
McLELLAN, F. W., elected 1882.
MELVIN, A. D., elected 1888, President 1909–10.
MEYERS, J. C., elected 1875.
OSGOOD, F. H., elected 1881, President 1896–97.
PENNIMAN, G. P., elected 1884.
PETERS, AUSTIN, elected 1883.
PIERCE, B. D., elected 1883.
ROBERTSON, J. L., elected 1868, Secretary 1869–74, President 1879–81.
ROSS, EDWARD C., elected 1884.
SALMON, DANIEL E., elected 1887, President 1897–98.
SCHREIBLER, J. W., elected 1885.
SHERMAN, W. A., elected 1882.
STRANGE, A., elected 1887.
VOGT, A. H., elected 1884.
WEBER, S. H., elected 1886.
WILLIAMS, W. L., elected 1885, President 1892–93.
WINCHESTER, J. F., elected 1878, President 1901–02.
WRAY, W. H., elected 1878.

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Atherton, Onesimus G., care Fred Eckart Packing Co., Fort Wayne, Ind.
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Breed, Frank, Pearl River, N. Y.
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Brown, Herbert A., P. O. Box 428, Victoria, B. C., Can.
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Brownlee, Wm. F., Little York, Ill.
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Bucher, Clarence S., 316 Livestock Exchange Bldg., Chicago, Ill.
Buchtel, John T., Tecumseh, Neb.
Buckingham, David E., 2115 14th St., Washington, D. C.
Buck, John M., B. A. I., Washington, D. C.
Buckley, John M., Brooklyn, N. Y.
Buckley, John S., College Park, Md.
Buencamino, V., Bureau of Agriculture, Manila, P. I.
Bullivant, James, Spokane, Wash.
Bullock, John L., Creedmoor, N. C.
Bundy, Edward A., 2150 Washington Ave., Ogden, Utah.
Burke, James W., 2012 Canalport Ave., Chicago, Ill.
Burkholder, Clinton E., Chief Lake, Mich.
Burley, Arthur J., 84 Hoyt St., Buffalo, N. Y.
Burnett, Jno. F., care of N. W. Mounted Police, Regina, Sask., Can.
Burnett, Samuel H., 410 Univ. Ave., Ithaca, N. Y.
Burnham, F. E., 728 Ogden Ave., Superior, Wis.
Burns, George H., Sioux Falls, S. D.
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Burr, Alexander, Old Court House, Boston, Mass.
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Bushnell, Fred F., Harvard, Ill.
Busman, Herman, 311 Livestock Exch. Bldg., Denver, Col.
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Butler, George W., 315 Federal Bldg., Indianapolis, Ind.
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Byerrum, Roswell O., Durant, Iowa.
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Cady, P. L., Fremont, Neb.
Cahill, Edward A., Canonsburg, Pa.

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Caldwell, Fred W., St. Joseph, Mo.
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